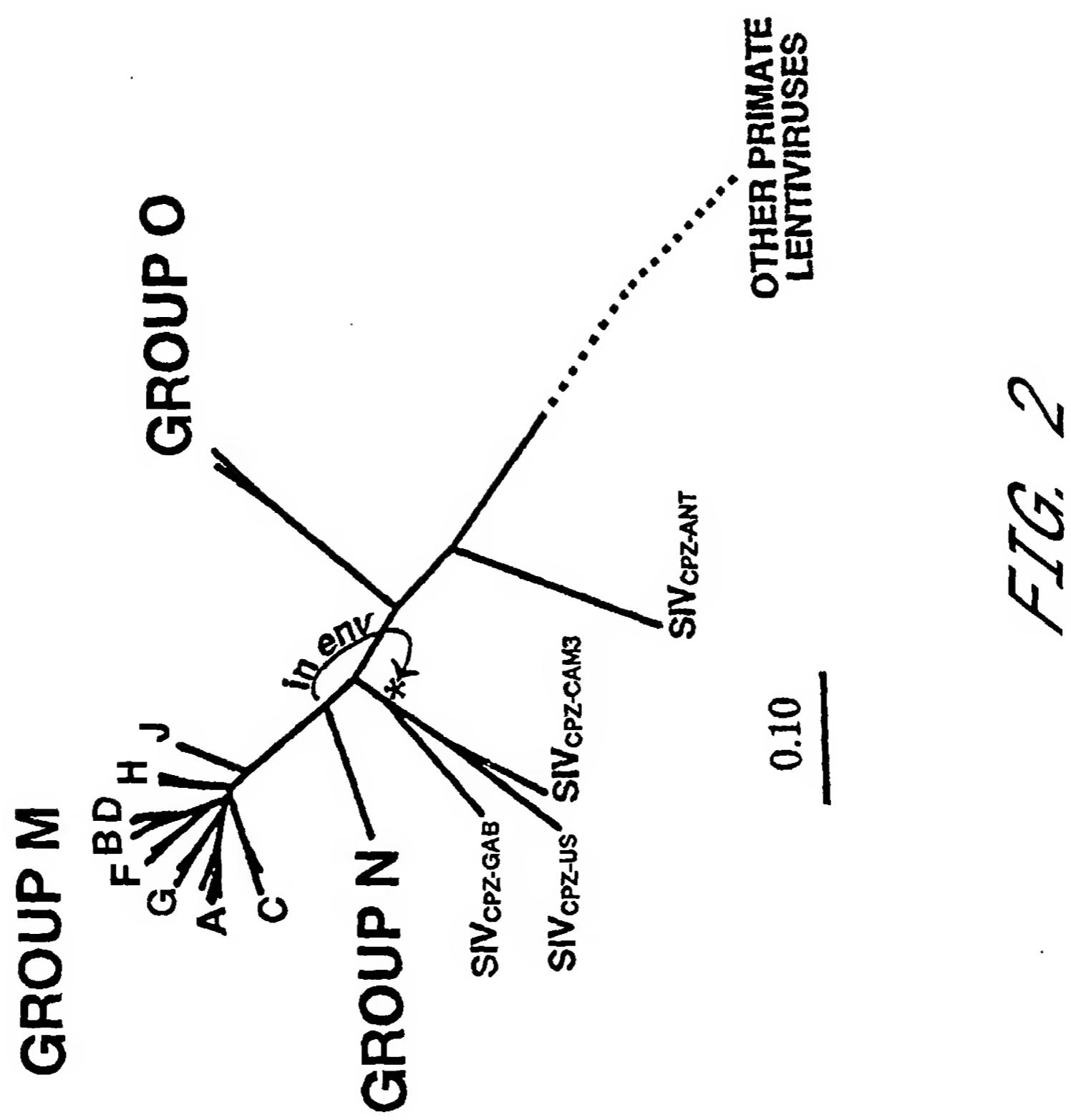


FIG. 1



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Chemokine coreceptor used	PBMC replication	Macrophage replication	T-cell-line replication	Replicative phenotype	Syncytium-inducing phenotype
X4	+	-	+	Rapid/high	++
R5	+	+	-	Slow/low	-
R5/X4	+	+	+	Rapid/high	+

FIG. 3

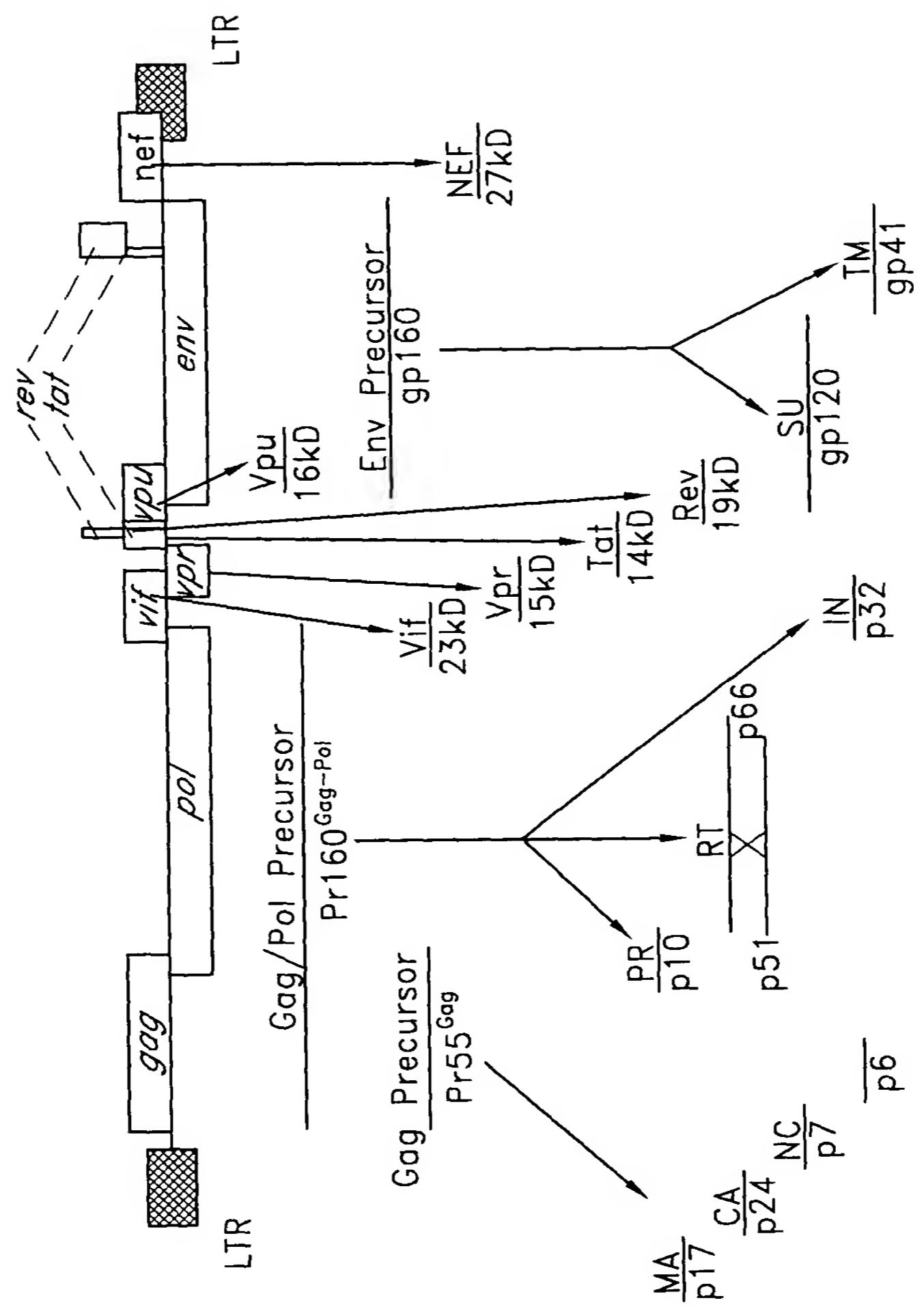


FIG. 4

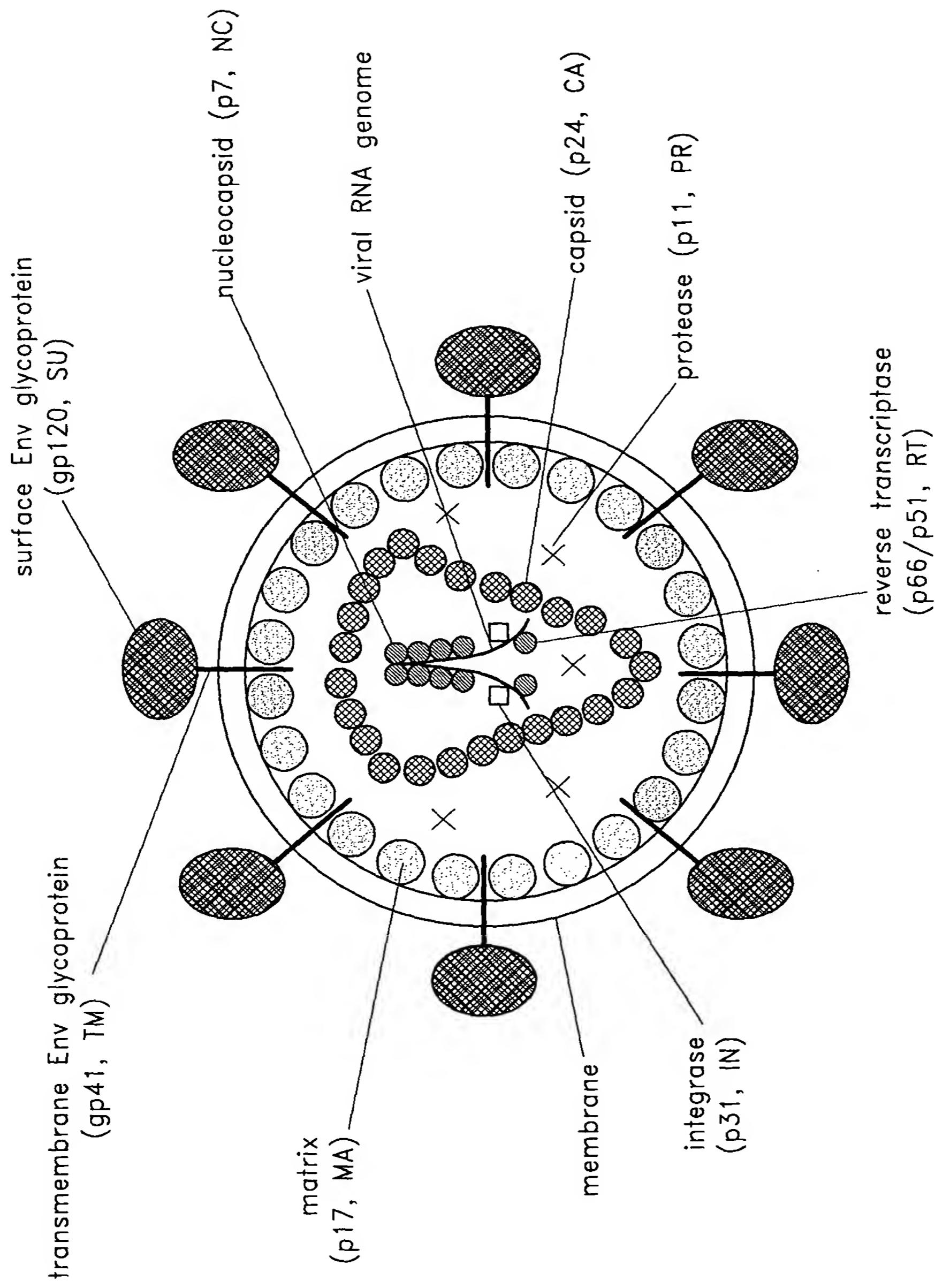


FIG. 5

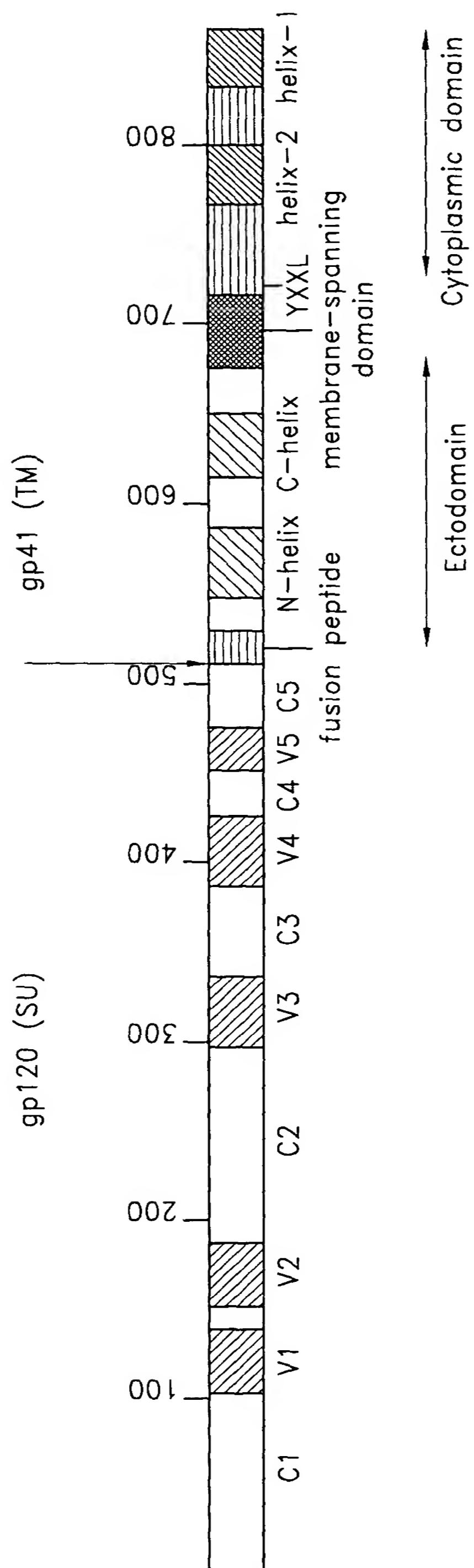


FIG. 6

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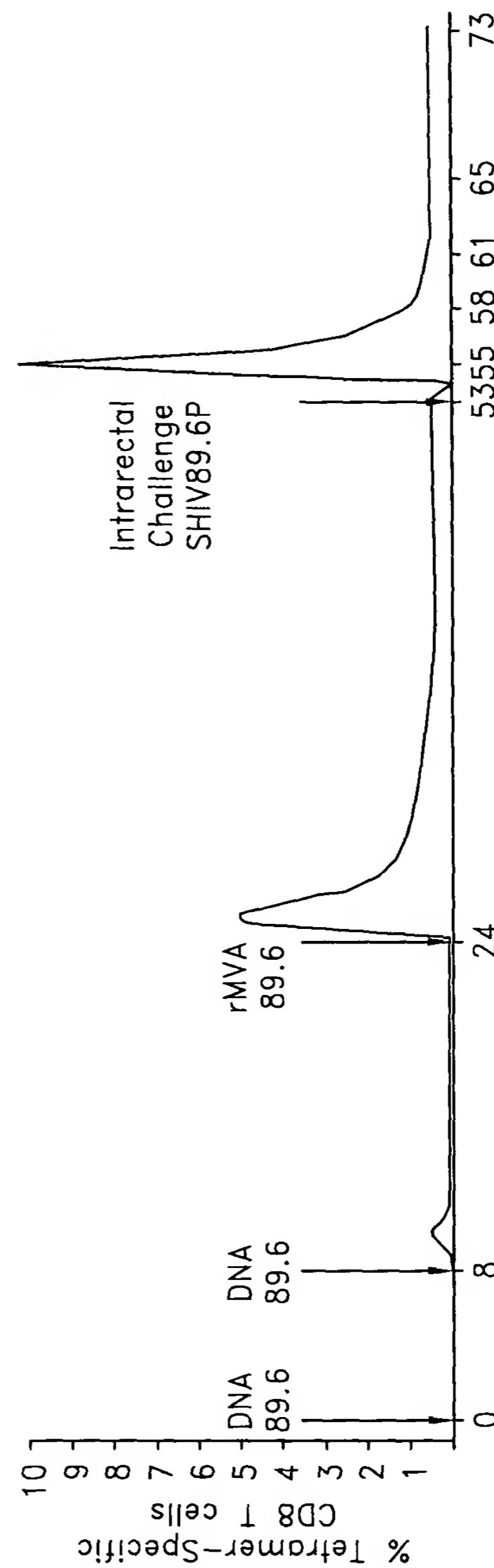


FIG. 7A

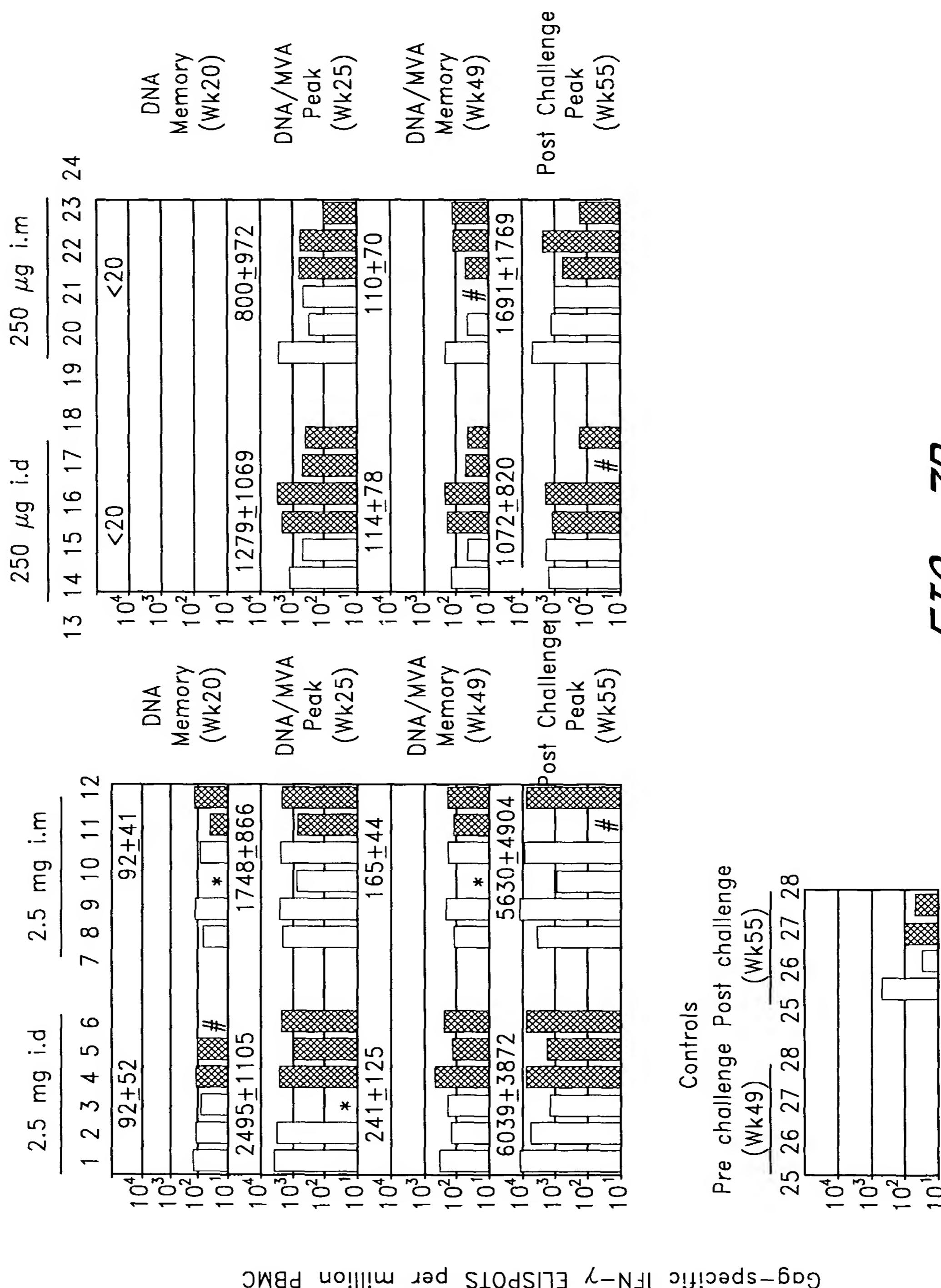


FIG. 7B

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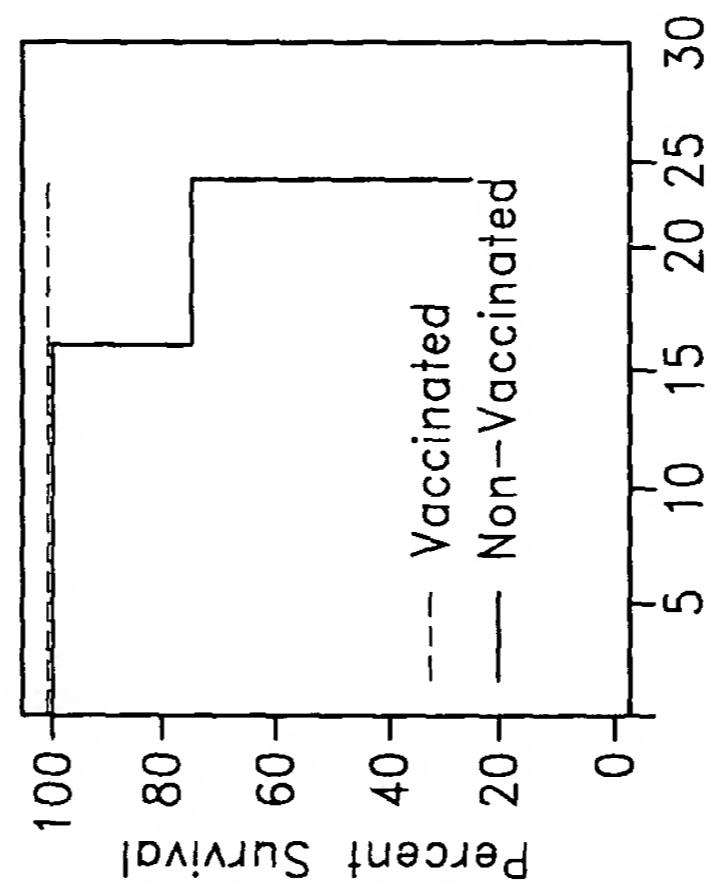


FIG. 8C

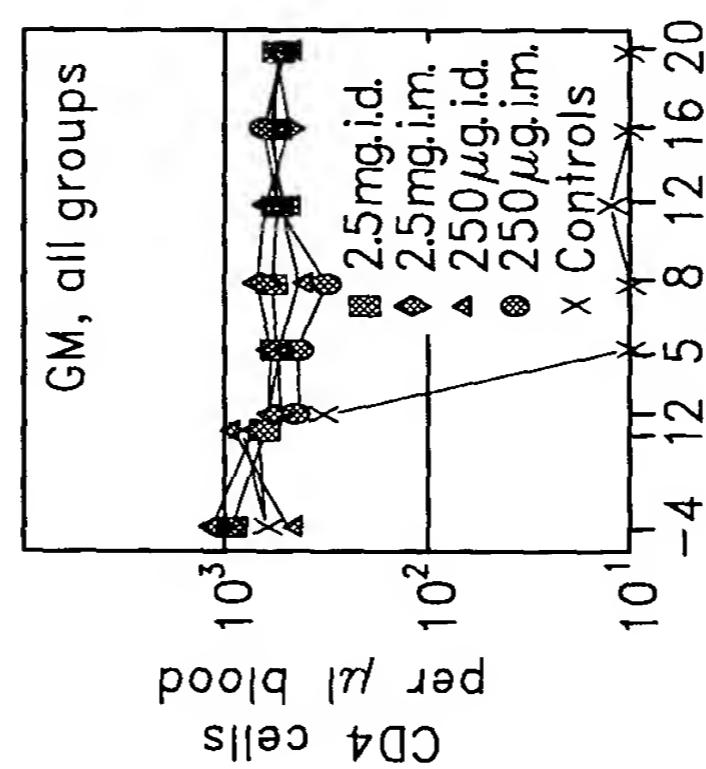


FIG. 8B

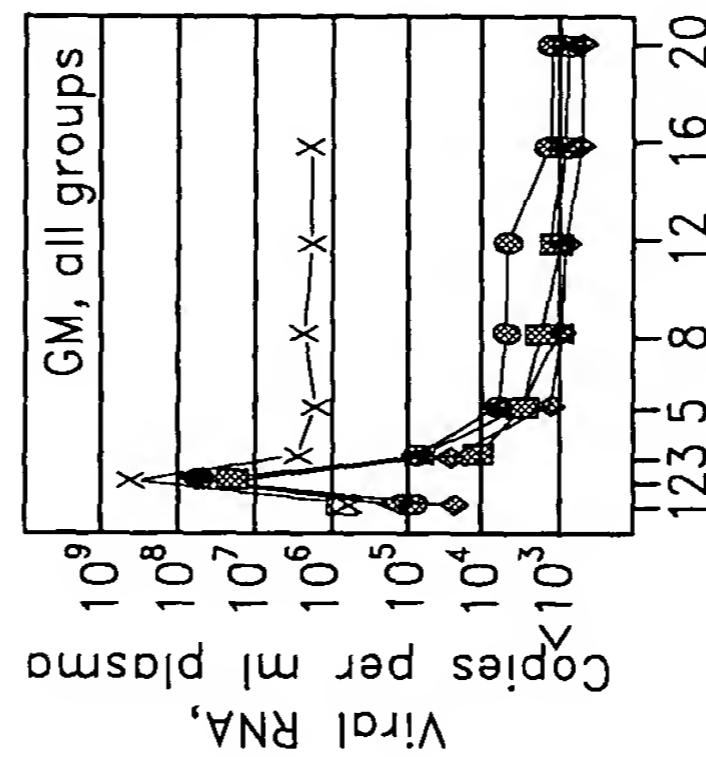


FIG. 8A

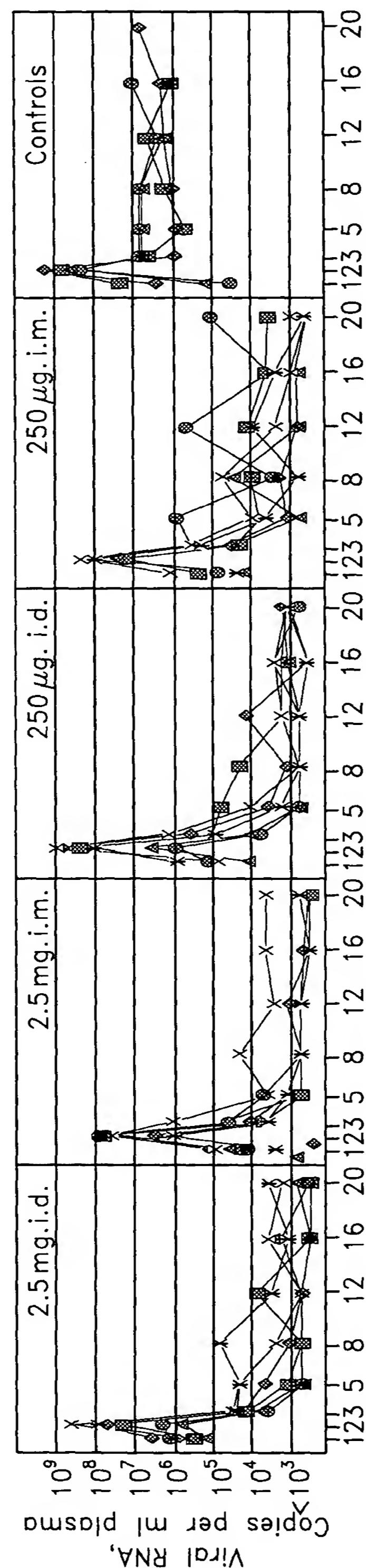


FIG. 8D

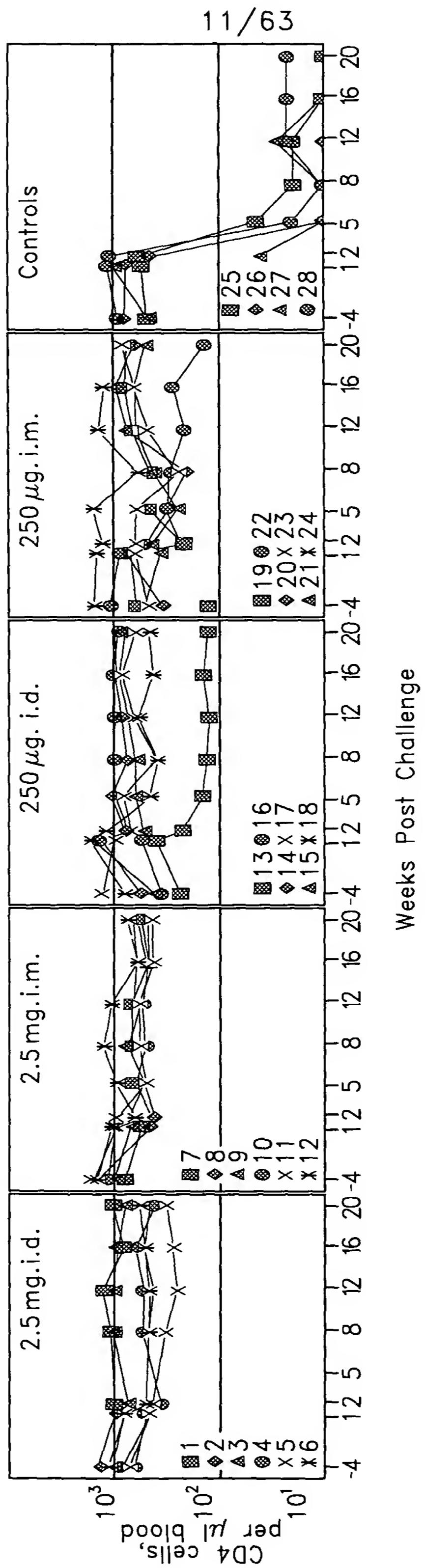


FIG. 8E

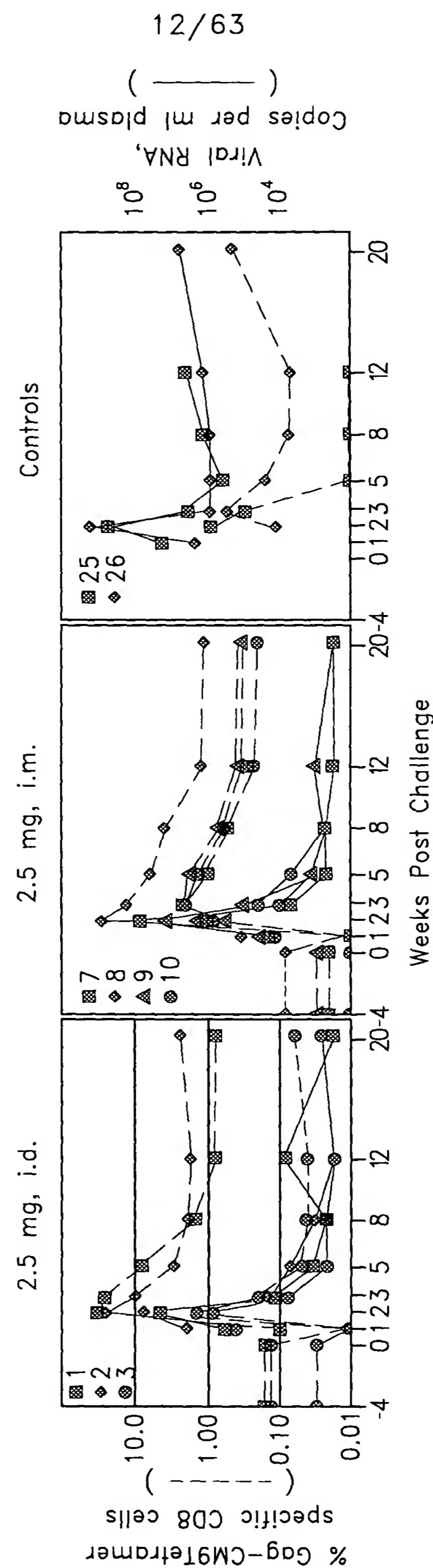


FIG. 9A

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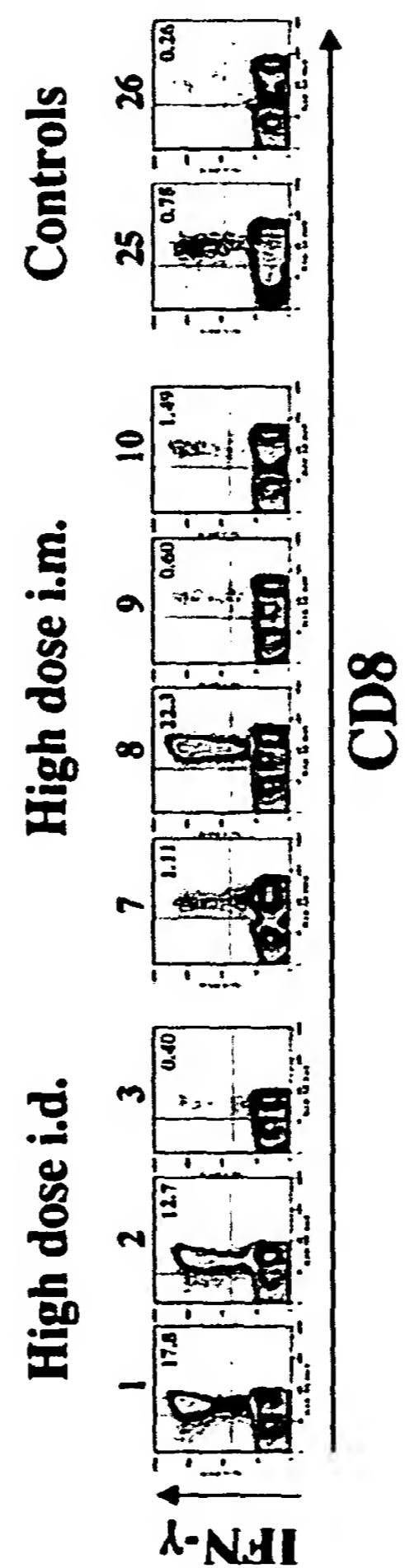


FIG. 9B

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL

GENES

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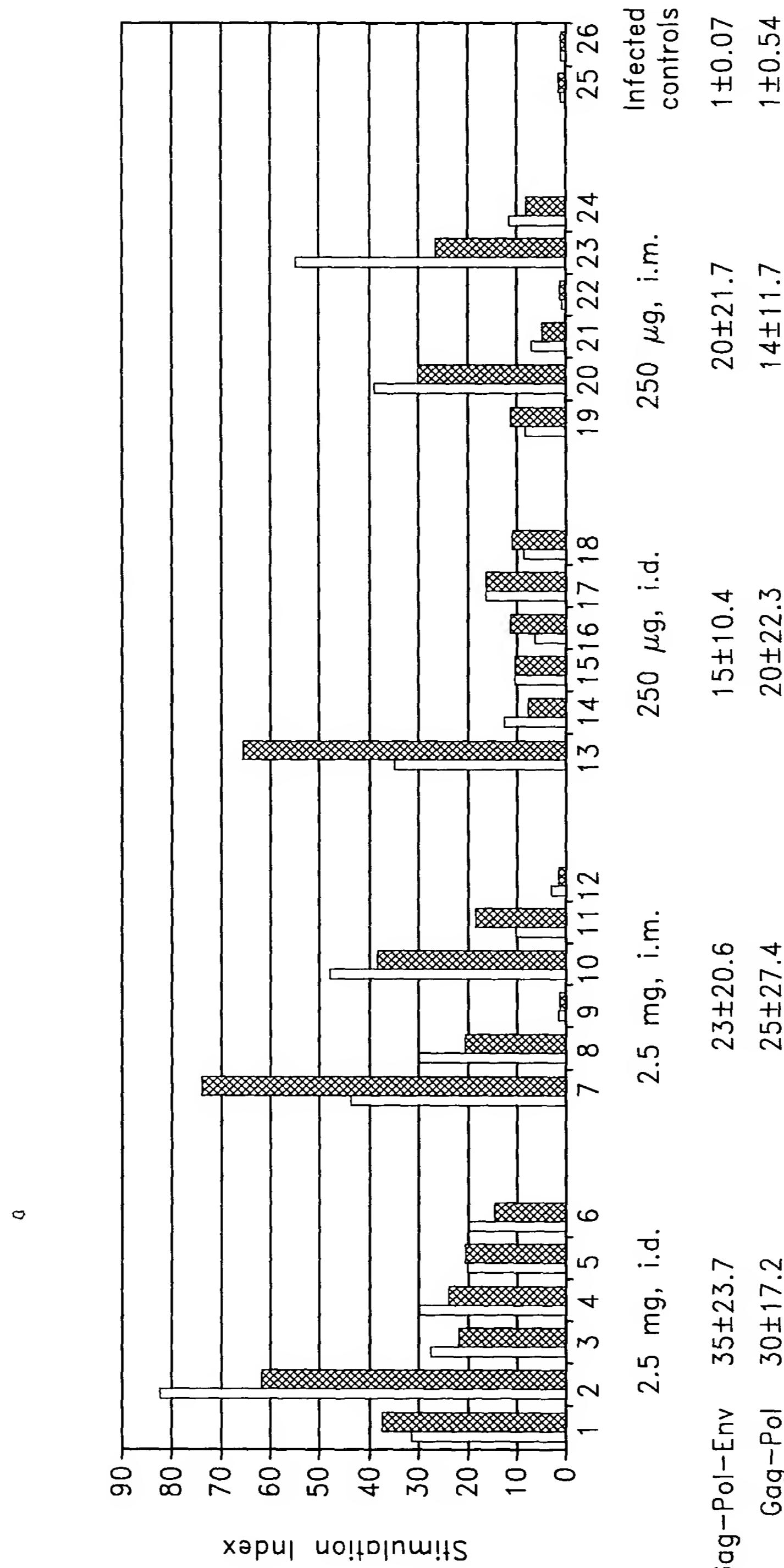


FIG. 9C

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FIG. 10A FIG. 10B FIG. 10C

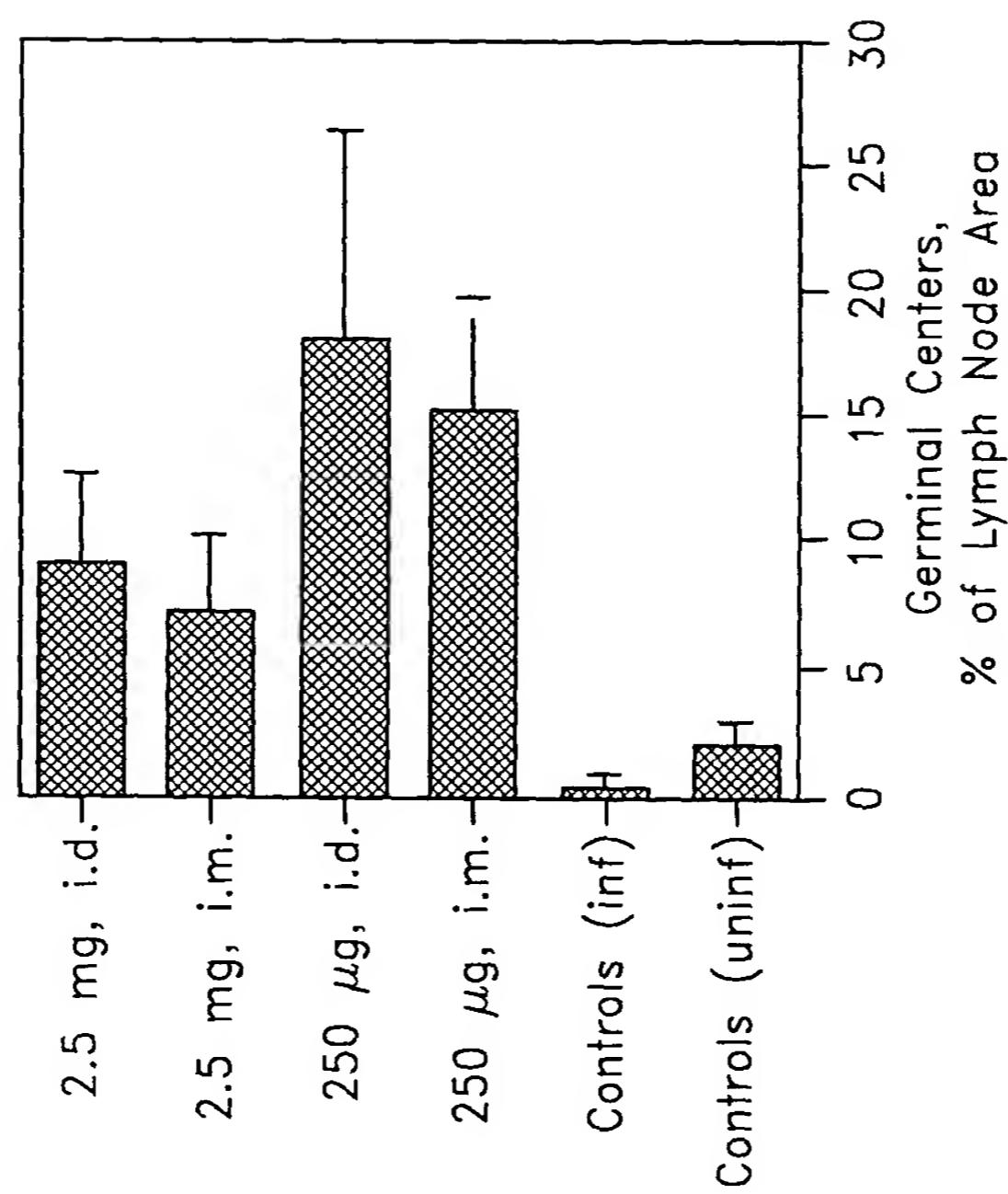


FIG. 10D

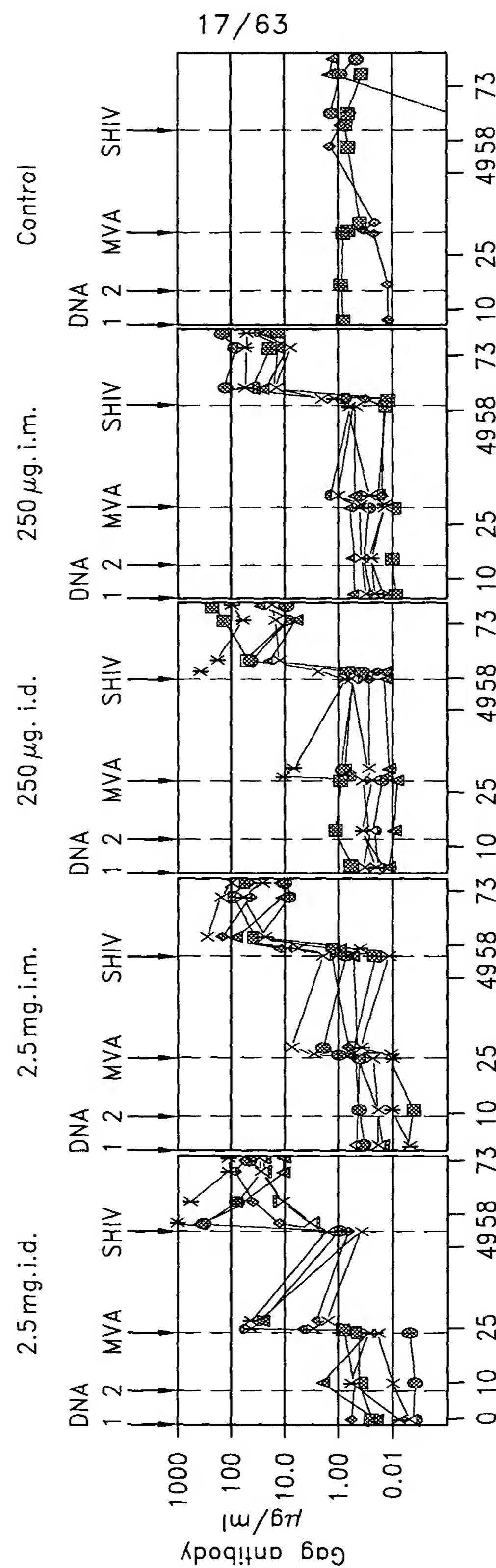


FIG. 11A

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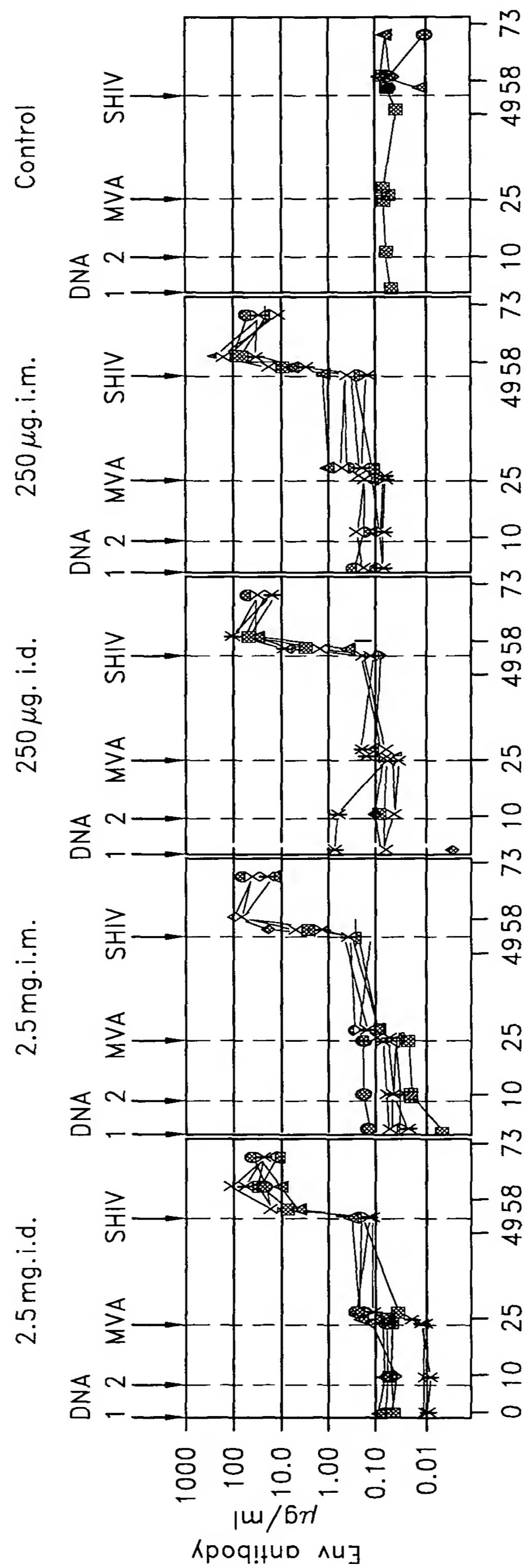


FIG. 11B

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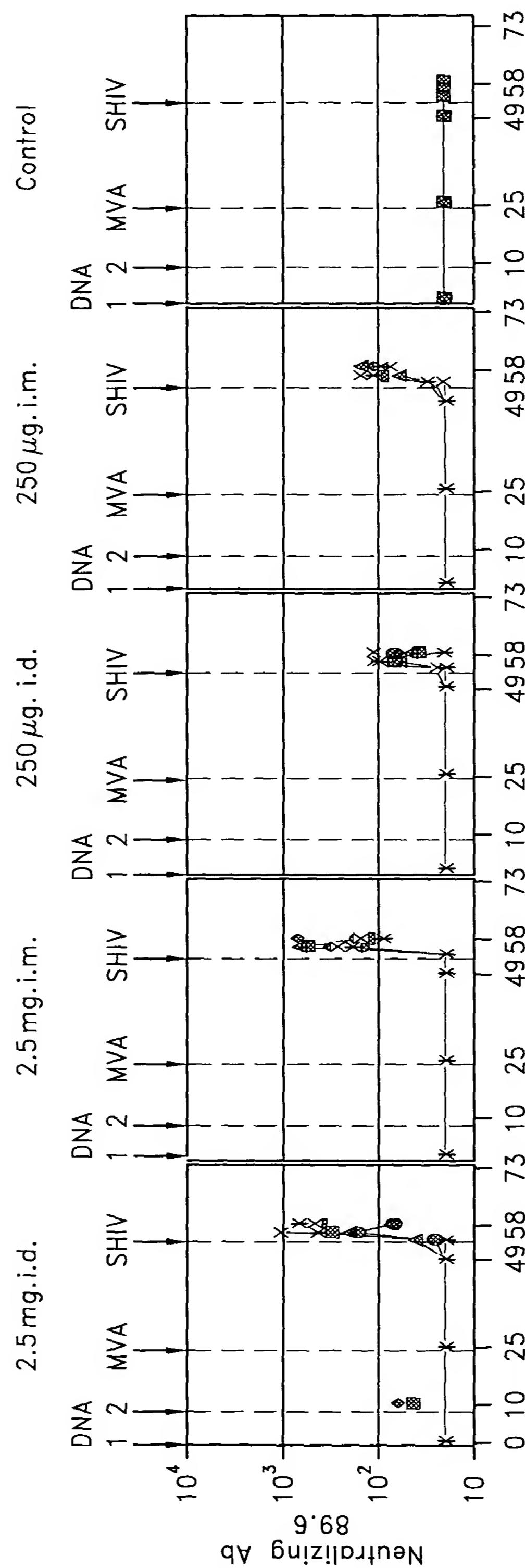


FIG. 11C

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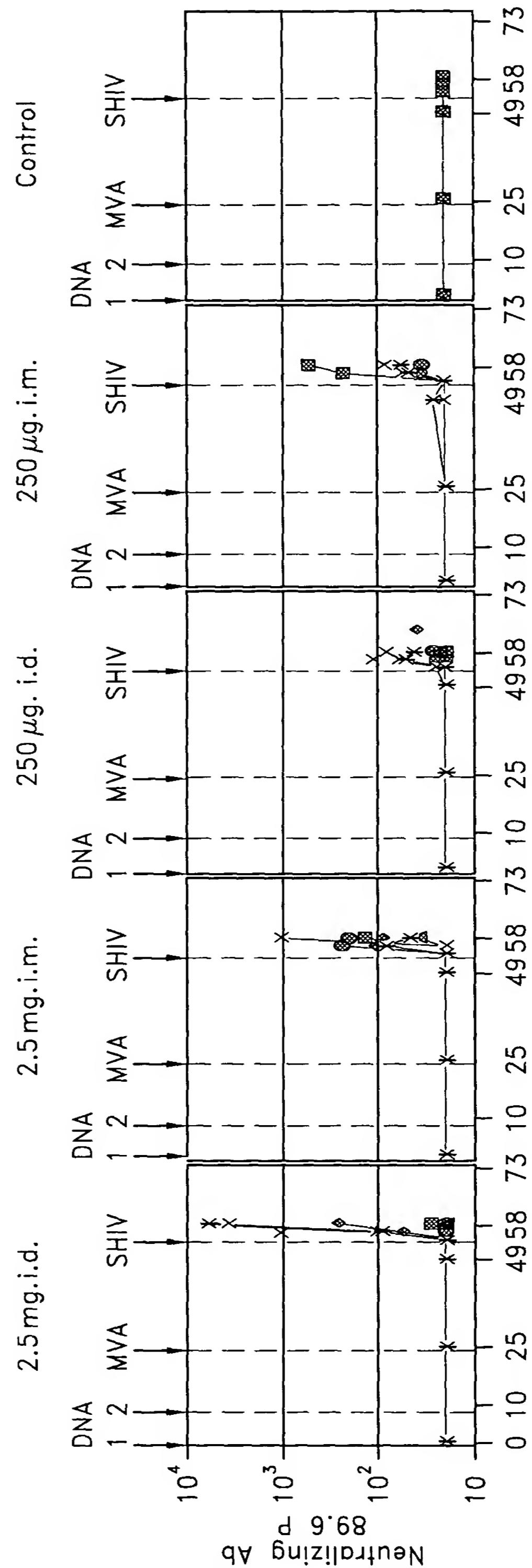


FIG. 11D

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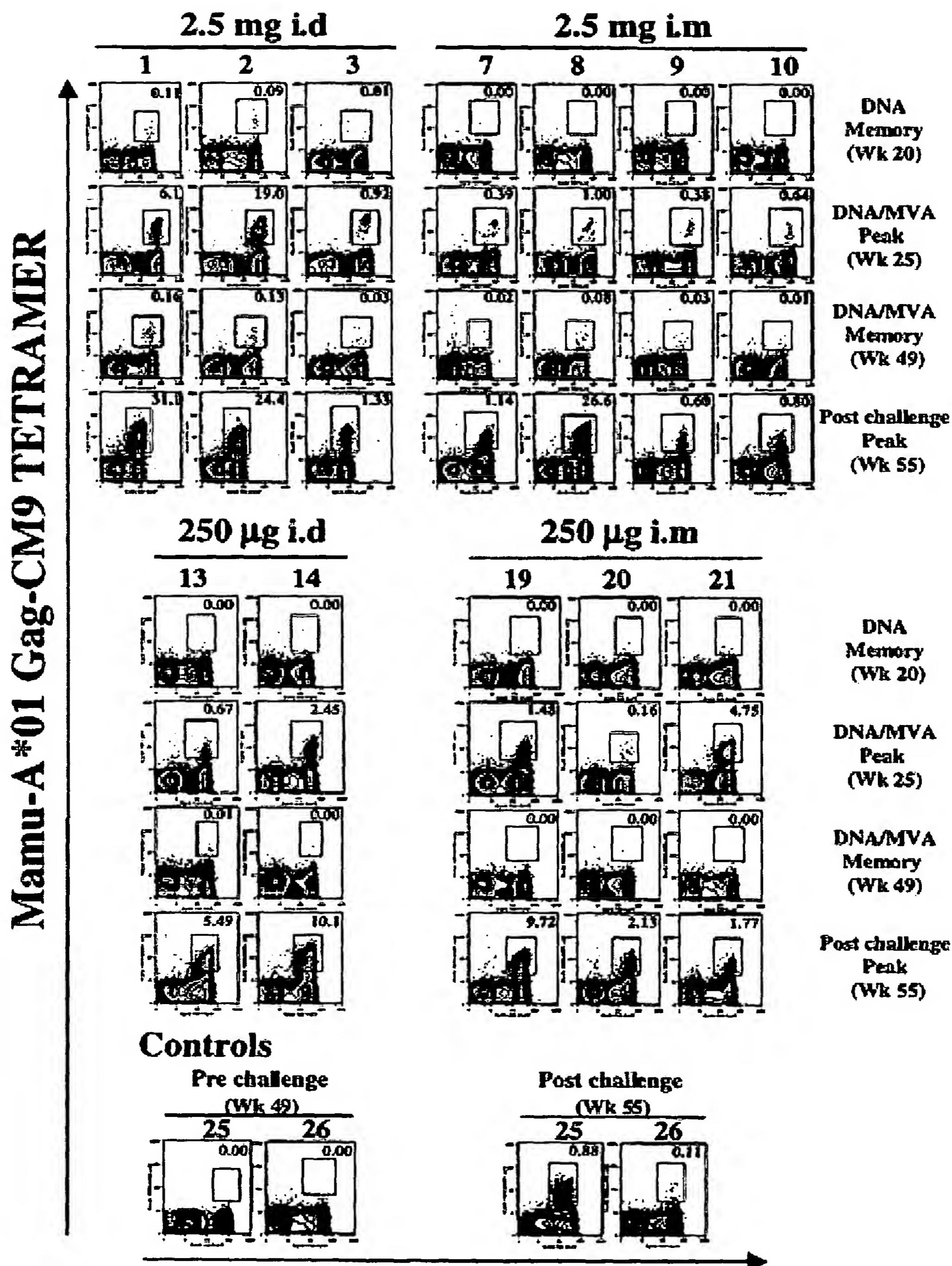


FIG. 12

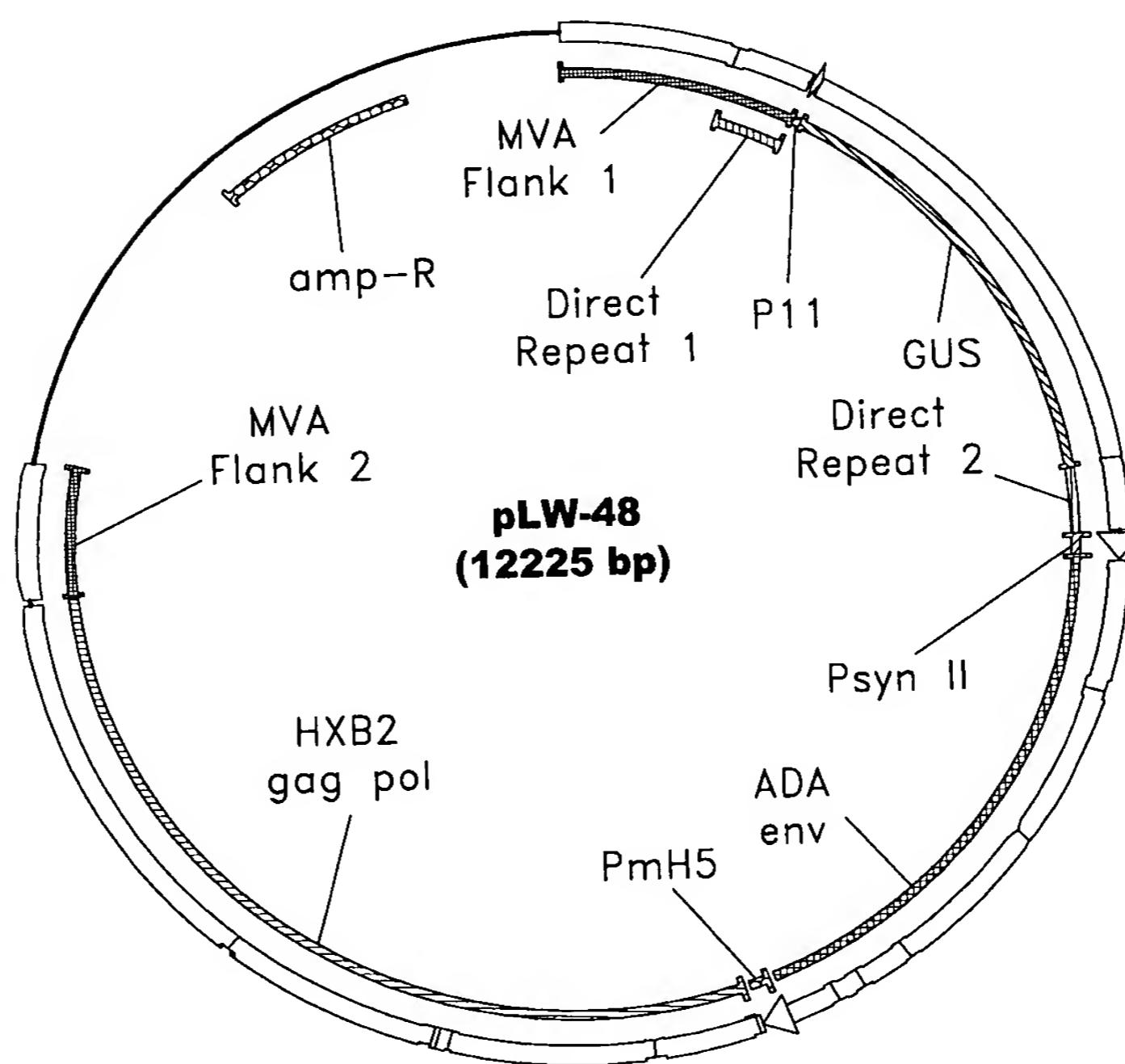


FIG. 13

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL
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1 GAATTCTGTTG GTGGTCGCCA TGGATGGTGT TATTGTATAAC TGTCATAAC CGTTAGTAAA ACATGGGGAG
CTTAAGAAC CACCAGGGT ACCTACCAAA ATAACATATG ACAGATTGCA GCAATCATT TGTAACGGCTC

71 GAAATAATC ATATAAAAAA TGATTTCATG ATTAACCATT GTTGTGAAAAA AGTCAAGAAC GTTCACATG
CTTTATTTAG TATATTTT ACTAAAGTAC TAATTTGGTA CAACACTTT TCAGTCTTG CAAGTGTAAAC

141 GCGGACAATC TAAAAACAAAT ACAGTGATTG CAGATTGCC ATATATGGAT AATGCCGTAT CCGATGTATG
CGCCTGTAG ATTTTGTAA TGTCACTAAC GTCTAAACGG TATACCTA TTACGCCATA GGCTACATAC

211 CAATTCACTG TATAAAAGA ATGTATCAAG AATATCCAGA TTTGCTAATT TGATAAAGAT AGATGACCAT
GTTAAGTGAC ATATTTCT TACATAGTTC TTATAGGTCT AACGATTAA ACTATTTCTA TCTACTGCTA

281 GACAAGACTC CTACTGGTGT ATATAATTAT TTTAAACCTA AAGATGCCAT TCCTGTTATT ATATCCATAG
CTGTTCTGAG GATGACCCACA TATATTAAATA AAATTGGAT TTCTACGGTA AGGACAATAA TATAGGTATC

351 GAAAGGATAG AGATGTTGT GAACTATTAA TCTCATCTGA TAAAGCCGTGT GCGTGTATAG AGTAAATTG
CTTCCCTATC TCTACAAACA CTTGATAATT AGAGTAGACT ATTTCGCACA CGCACATATC TCAATTAAAG

FIG. 14A

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL
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421 ATATAAGTA GCCATTCTC CCATGGATGT TTCCCTTTT ACCAAAGGAA ATGCATCATT GATTATTCTC
TATATTCAAT CGGTAAGAAG GGTACCTACA AAGGAAAAAA TGTTTCTT TACGTAGTAA CTAATAAGAG

491 CTGTTGATT TCTCTATCGA TCGGGCACCT CTCTTAAGAA GTCTAACCGA TAATAATGTT ATTATATCTA
GACAAACTAA AGAGATAGCT AGGGCGTGGAA GAGAATTCTT CACATTGGCT ATTATACAA TAATATAGAT

561 GACACAGGG TCTACATGAC GAGCTTCCGA GTTCCAATTG GTCAAGT TACATAAGTA TAAAGTCCGA
CTGTGTCGC AGATGTACTG CTCGAAGGCT CAAGGTTAAC CAAGTCAAATGTTATTCAATTTCAGGCT

631 CTATTGTTCT ATATTATATA TGTTGTTGA TGGATCTGT ATGCATGCAA TAGCTGATAA TAGAACTTAC
GATAACAAGA TATAATATAACCAAACT ACCTAGACAC TACGTACGTT ATCGACTATT ATCTTGAAATG

701 GCAAATATTAA GCAAATAT ATTAGACAAT ACTACAATTAA AGCATGAGTG TAGATGCTGT TATTTTGAAC
CGTTTATAAT CGTTTTATA TAATCTGTTA TGATGTTAAT TGCTACTCAC ATCTACGACA ATAAAACCTTG

FIG. 14B

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL

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771 CACAGATTAG GATTCTTGAT AGAGATGAGA TGCTCAATGG ATCATCGTGT GATATGAACA GACATTGTAT
GTGCTTAATC CTAAGAACTA TCTCTACTCT ACCAGTTACC TAGTAGCACA CTATACTTGT CTGTAACATA

.....
.....

841 TATGATGAAT TTACCTGATG TAGGCGAATT TGGATCTAGT ATGTTGGGAA AATATGAACC TGACATGATT
ATACTACTA AATGGACTAC ATCCGCTAA ACCTAGATCA TACAACCCCT TTATACTTGTG ACTGTACTAA

.....
.....

911 AAGATTGCTC TTTCGGTGGC TGGGTACCG GCGCCGCTTT CATTITGTTT TTTTCTATGC TATAAATGGT
TTCTAACCGAG AAAGCCACCG ACCCATGGTC CGGGGGAAA GTAAAACAAA AAAAGATAAG ATATTTACCA

.....
.....

981 ACGTCCTGTA GAAACCCAA CCCGTGAAT CAAAAAACTC GACGGCCTGT GGGCATTCAAG TCTGGATCGC
TGCAGGACAT CTTTGGGTTT GGGCACTTTA GTTTTTGAG CTGCCGGACA CCCGTAAGTC AGACCTAGCG

.....
.....

1051 GAAAATGCTG GAATTGATCA GCGTTGGTGC GAAAGGGCGT TACAAGAAAG CCGGGCAATT GCTGTCGCCAG
CTTTGACAC CTTAACTAGT CGCAACCACC CTTTCGGCA ATGTTCTTTC GGGCCGTTAA CGACACGGTCA

.....
.....

FIG. 14C

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL

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1121 GCAGTAA CGATCAGTTC GCCGATGCAG ATATTCTAA TTATGGGGC AACGTCAGT ATCAGCGCGA CGTCAAATT GCTAGTCAAG CGGCTACGTC TATAAGCATT AATACGGCC TTGAGACCA TAGTCGCGCT

1191 AGTCTTATA CCGAAAGGTT GGGCAGGCCA GCCTATCGTG CTGGGTTCG ATGCGGTAC TCATTACGGC TCAGAAATT GGCTTCCAA CCCGTCGGT CGCATAGCAC GACGCAAAGC TACGCCAGTG AGTAATGGCG

1261 AAAGTGTGG TCAATAATCA GGAAGTGTAG CAGCATCAGG CCCGCTATAC CCCATTGAA GCCGATGTCA TTTCACACCC ACTTATTAGT CCTTCACTAC CTCGTAGTCC CGCCGATATC CGGTAAACTT CGGCTACAGT

1331 CGCCGTATGT TATTGGGGG AAAAGTGTAC GTATCACCGT TTGTGTGAAC AACGAACGTG ACTGGCAGAC GCGGCATACA ATAACGGCCC TTTTCACATG CATACTGGCA AACACACTTC TTGCTTGACT TGACCCGCTG

1401 TATCCCGCCG GGAATCGTGA TTACCGACCA AAACGGCAAG AAAAAGGAGT CTTACTTCGA TGATTCTTT ATAGGGGGCC CCTTACCACT AATGGCTGCT TTGCGGTCA GAATGAAGGT ACTAAAGAA

1471 AACTATGCCG GAATCCATCG CAGCGTAATG CTCTACACCA CGCCGAACAC CTGGGTGGAC GATATCACCG TTGATAACGGC CTTAGGTAGC GTCGCATTAC GAGATGTGGT GCGGCTTGTG GACCCACCTG CTATAGTGGC

FIG. 14D

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL
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1541 TGGTGACGCA TGTGGCAA CACTGTAACC ACGCGTCTGT TGACTGGCAG GTGGTGGCCA ATGGTGTATGT
 ACCACTGGGT ACAGGGCGTT CTGACATTGG TGCGCAGACA ACTGACCGTC CACCAACCGGT TACCACTACA

1611 CAGCGTTGAA CTCGGTGATG CGGATCAACA CGTGGTGCAC ACTGGACAAAG GCACTAGCGG GACTTTGCCAA
 GTCCGCAACTT GACGGCACTAC GCCTAGTTGT CCACCAACGT TGACCTGTTG CGTGATCGCC CTGAAACGTT

1681 GTGGTGAATC CGCACCTCTG GCAACCGGGT GAAGGTTATC TCTATGAACG GTGCGGTACAC CCCAAAGCC
 CACCACCTAG GCGTGGAGAC CGTTGGCCCA CTTCCAATAG AGATACTTGA CACGCCAGTGT CGGTGTTTCCG

1751 AGACAGAGTG TGATATCTAC CCGCTTCCG TCGGCATCCG GTCACTGGCA GTGAAGGGGG AACAGTTCT
 TCTGCTCAC ACTATAGATG GGGGAAGGCC AGCCGTAGGC CAGTCACCGT CACTTCCCCG TTGTCAAGGA

1821 GATTAACCAC AAACCGTTCT ACTTTACTGG CTTGGTCCGT CATGAAGATG CGGACTTGGC TGGCAAAGGA
 CTAATTGGTG TTTGGCAAGA TGAATGACC GAAACCAGCA GTACTTCTAC GCCTGAACGC ACCGTTCTCT

1891 TTCGATAACG TGCTGATGGT GCACGACCAAC GCATTAATGG ACTGGATTGG GGCCAACTCC TACCGTACCT
 AAGCTATTGC ACCGACTACCA CGTGGTGGTG CGTAATTACC TGACCTAACCC CCGGTTGAGG ATGGCATGGA

FIG. 14E

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL

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1961 CGCATTACCC TTACGCTGAA GAGATGCTCG ACTGGGCAGA TGAACATGGC ATCGTGGTGA TTGATGAAAC
GCGTAATGGG AATGCGACTT CTCTACGAGC TGACCCGTCT ACCTTGTACCG TAGCACCACT AACTACTTGT

2031 TGCTGCTGTC GGCTTAAACC TCTCTTAGG CATTGGTTTC GAAGGGGCA ACAAGCCGAA AGAACTGTAC
ACGACGACAG CCCAAATTGG AGAGAAATCC GTAACCAAG CCTCGCCGCTA ATGTCGGCTA TCTTGACATG

2101 AGCGAAGAGG CAGTCAACGG CGAAACTCAG CAAGGGCACT TACAGGGCAT TAAAGAGCTG ATAGGGGGTG
TCGCTTCTCC GTCAGTGGCC CCTTTCAGTC GTCAGTGGCA ATGTCGGCTA ATTTCTCGAC TATCGGGCAC

2171 ACAAAACCA CCCAAGGGTG GTGATGTTGA GTATTGCCAA CGAACCGGAT ACCCGTCCGC AAGGTGCACG
TGTTTTGGT GGGTTCGCAC CACTACACCT CATAACGGTT GCTTGGCCTA TGGGCAGGG TTCCACGTTG

2241 GGAATATTTC GCGCCACTGG CGGAAGCAAC GCGTAAACTC GACCCGACGC GTCCGATCAC CTGGCTCAAT
CCTTATAAG CGGGGTGACC GCCTTCGTTG CGCATTGAG CTGGGCTGG CAGGGTAGTG GACGGAGTTA

2311 GTAATGTTCTT GCGACGGCTCA CACCGATAACC ATCAGCGATC TCTTTGATGT GCTGTCCTG AACCGTTATT
CATTACAAGA CGCTGGGAGT GTGGCTATGG TAGTCGGCTAG AGAAACTACA CGACACGGAC TTGGCAATAA

FIG. 14F

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL
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2381 ACGGATGGTA TGTCCAAGC GGCGATTGGA AACGGCAGA GAAGGTACTG GAAAAGAAC TTCTGGCCTG
TGCCTTACCAT ACAGGTTTCG CCGCTAAACC TTTGCCGTCT CTTCCATGAC CTTTTCTTGT AAGACGGAC

2451 GCAGGAGAAA CTGGCATCAGC CGATTATCAT CACCGAATAC GCGGTGGATA CGTTAGCCGG GCTGGCACTCA
CGTCCTCTT GACGTAGTCG GCTAATAGTA GTGGCTTATG CCGCACCTAT GCAATCGGCC CGACGTGAGT

2521 ATGTACACCG ACATGTGGAG TGAAGAGTAT CAGTGTGCAT GCCTGGATAT GTATCACCGC GTCTTTGATC
TACATGTGGC TGTACACCTC ACTTCTCATC GTCACACGTAA CCGACCTATA CATACTGGCG CAGAAACTAG

2591 GCGTCAGGCC CGTCGTCGGT GAACAGGTAT GGAATTTCGG CCATTTCGG ACCTCGCAAG GCATATTGCG
CGCAGTCGGC GCAGCAGCCA CTTGTCATA CCTTAAACGG CCTAAACGG TGGAGCGTTT CGTATAACGC

2661 CGTTGGCGGT AACAAAGAAAG GGATCTTCAC TCGCGACCC AACCGAAAGT CGGGGGCTT TCTGCTGCAA
GCAACCCCA TTGTTCTTC CCTAGAAGTG AGCGCTGGCG TTGGCTTC GCGCCGAAA AGACGACGTT

2731 AAACCCCTGGA CTGGCATGAA CTFGGTGA AACCCGGCAGC AGGGAGGCCA ACAATGAGAG CTCGGTTGTT
TTTGGGACCT GACCGTACTT GAAGCCACTT TCCCTCCGTT TGTTACTCTC GAGCCAAACAA

FIG. 14G

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL
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2801 GATGGATCTG TGATGCCATGCC AATAGCTGAT AATAGAACTT AGCCAAATAT TAGCCAAAAT ATATTAGACAA
CTACCTAGAC ACTACGTAACG TTATCGACTA TTATCTTGAA TGCCTTTATA ATCGTTTTA TATAATCTGT
|||||||

2871 ATACTACAAT TAACCGATGAG TGTAGATGCT GTTATTTGCA ACCACAGATT AGGATCTTG ATAGAGATGAA
TATGATGTTA ATTGCTACTC ACATCTACGA CAATAAAACT TGCTGTCTAA TCCTAAGAAC TATCTCTACT
|||||||

2941 GATGCTCAAT GGATCATCGT GTGATATGAA CAGACATTGT ATTATGATGA ATTACCTGA TGTACGGCAA
CTACGAGTTA CCTAGAGCA CACTACTT GTCTGTAAACAA TAATACTACT TAAATGGACT ACATCCGGCTT
|||||||

3011 TTTGGATCTA GTATGTTGG GAAATATGAA CCTGACATGA TTAAGATGCT TCTTTCGGTG GCTGGGGCC
AACCTAGAT CATAAACCC CTTTAACTT GGACTGTACT AATTCTAACG AGAAAGCCAC CGACCCGGGG
|||||||

3081 CGCTCGAGTA AAAATGAAA AAATATCTA ATTATAGGA CGGTTTGAT TTCTTTTTT TCTATGCTAT
GGGAGCTCAT TTTTACTTT TTATAGAT TAAATATCCT GCCAAACTA AAAGAAAAA AGATACGATA
|||||||

3151 AAATAATAAA TAGGGGGGC ACCATGAAAG TGAAGGGGAT CAGGAAGAAAT TATCAGGCACT TGTCGAATG
TTTATATT ATCGGGGG TGTTACCTTC ACTTCCCTTA GTCCCTTTA ATAGTCGTGA ACACCTTAC
|||||||

FIG. 14H

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3221 GGGCATCATG CTCCTGGGA TGTTGATGAT CTGTAGTGC ACTCTATTGTTT GTGCATCAGA AGCAACCACCG ACTCTATTGTTT GTGCATCAGA TGCTAAAGCA TATGATAACAG
CCCCTAGTAC GAGGAACCCCT ACAACTACTA GACATCACCA CATCTTAA ACACCCAGTG TCAAATAATA
.....

3291 GGGGTACCTG TGCGGAAAGA AGCAACCACCG ACTCTATTGTTT GTGCATCAGA TGCTAAAGCA TATGATAACAG
CCCCATGGAC ACACCTTCTC TCGTTGGTG TGAGATAAAA CACGTAGTCT ACGATTTCGT ATACTATGTC
.....

3361 AGGTACATAA TGTTTGGCC ACACATGGCCT GTGTACCCAC AGACCCCCAAC CCACAAGAAC TAGTATTGGA
TCCATGTATT AAAACCCGG TGTGTACGGA CACATGGTG TCTGGGTG GGTGTTCTC ATCATAACCT
.....

3431 AAATGTGACA GAAATTGTTA ACATGTGGAA AAATAACATG GTAGAACAGA TGCATGAGGA TATAATCAGT
TTTACACTGT CTTTAAAT TGTACACCTT TTTATTGTAC CATCTTGCT ACGTACTCCT ATATTAGTCA
.....

3501 TTATGGATC AAAGCCTAA GCCATGTGTA AAATTAACCC CACTCTGTGT TACTTTAAAT TGCACTGATT
AATACCTAG TTTCGGATT CGGTACACAT TTTAATTGGG GTGAGACACA ATGAAATTAA ACGTGACTAA
.....

3571 TGAGGAATGTTACTAATATC AATAATAGTA GTGAGGAAT GAGAGGAGAA ATAAAAAAACT GCTCTTTCAA
ACTCCTTACA ATGATTATAG TTATTATCAT CACTCCCTTA CTCTCCCTT TATTTTTGA CGAGAAAGTT
.....

FIG. 14I

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL
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3641 TATCACCA AGCATAAGAG ATAAGGTGAA GAAAGACTAT GCACTTTCT ATAGACTTGA TGTAGTACCA
ATAGTGGT TCGTATTCTC TATTCCACTT CTTCTGATA CGTGAAAGA TATCTGAAC ACATCATGGT
.....

3711 ATAGATAATG ATAATACTAG CTATAGGTG ATAAATTGTA ATACCTCAAC CATTACACAG GCCTGTC
TATCTATTAC TATTATGATC GATATCCAAC TATTTAACAT TATGGAGTTC GTAAATGTC CGGACAGGTT
.....

3781 AGGTATCCCT TGAGCCATT CCCATACATT ATTGTACCC GGCTGGTTT GCGATTCTAA AGTGTAAAGA
TCCATAGGAA ACTCGGTAA GGGTATGTA TAACATGGG CCGGACCAAA CGCTAAGATT TCACATTCT
.....

3851 CAAGAAGTTC AATGGAACAG GGCCATGTA AAATGTCAGC ACAGTACAAT GTACACATGG AATTAGGCCA
GTTCTTCAAG TTACCTTGTGTC CCGGTACATT TTTACAGTC TGTCAATGTTA CATGTGTACCC TTAATCCGGT
.....

3921 GTAGTGTCAA CTCAACTGCT GTAAATGGC AGTCTAGCAG AAGAAGAGGT AGTAATTAGA TCTAGTATT
CATCACAGT GAGTGGCA CAATTACCG TCAGATGGC TTCTTC
.....

3991 TCACAGACAA TGGAAAAAAC ATAATACTAC AGTTGAAAGA ATCTGTAGAA ATTAAATTGTA CAAGACCCAA
AGTGTCTGTT ACGTTTTTG TATTATCATG TCAACTTTCT TAGACATCTT TAATAACAT GTTCTGGGTT
.....

FIG. 14J

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL

GENES

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4061 CAACAATACA AGGAAAGTA TACATATAGG ACCAGGAAGA GCATTTATA CAACAGGAGA AATAATAGGA
GTTGTTATGT TCCTTTCT ATGTATATCC TGGTCCTCT CGTAAATAT GTTGTCTCT TTATTATCCT
.....

4131 GATATAAGAC AAGCACATTG CAACATTAGT AGAACAAAAT GGAATAACAC TTTAAATCAA ATAGCTACAA
CTATATTCTG TTCGTGTAAAC GTTGTAAATCA TCTTGTGTTA CCTTATGTG AAATTAGT TATCGATGTT
.....

4201 ATTAAAAGA ACAATTGGG ATAATAAAA CAATAGTCTT TAATCAATCC TCAGGAGGG ACCCAGAAAT
TTAATTCTCT TTGTTAACCC TTATTTT GTTATCAGAA ATTAGTAGG AGTCCTCCC TGGTCTTTA
.....

4271 TGTAATGCAC AGTTTTAATT GTGGAGGGGA ATTCTTCTAC TGTAATCAA CACAACATGT TAATAGTACT
ACATTACGTG TCAAATTTAA CACCTCCCCT TAAGAAGATG ACATTAAGTT GTGTGTGACA ATTATCATGA
.....

4341 TGGAATTTA ATGGTACTTG GAATTAAACA CAATCGAATG CTACTGAAGG AAATGACACT ATCACACCTCC
ACCTTAAAT TACCATGAAC CTTAAATTGT GTTAGCTTAC CATGACCTTC TTTACTGTGA TAGTGTGAGG
.....

4411 CATGTAGAAAT AAAACAAATT ATAAATATGT GGCAAGGAAGT AGGAAAAGCA ATGTATGCCCT CTCCCATCAG
GTACATCTTA TTGTTGTGTTAA TATTATAACA CCGTCCCTCA TCCTTTTCGT TACATACGGG GAGGGTAGTC
.....

FIG. 14K

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL

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4481 AGGACAAATT AGATGCTCAT CAAATTAC AGGGCTAATA TTAACAAAGAG ATGGTGGAAC TAACAGTAGT
TCCCTGTTAA TCTACGAGTA GTTATAATG TCCCGATTAT AATTGTTCTC TACCAACCTG ATTGTCACTCA
.....

4551 CGGTCCGAGA TCTTCAGACC TCGGGAGGA GATATGAGGG ACAATTGGAG AAGTGAATTAA TATAAATATA
CCCAGGCTCT AGAAGTCTGG ACCCCCTCCT CTATACTCCC TGTAAACCTC TTCACTTAAT ATATTTAT
.....

4621 AAGTAGTAAA ATTGAAACCA TTAGGAGTAG CACCCACCAA GGCACAAAGA AGAGTGGTGC AGAGAGAAAA
TTCATCATTT TTAACTTGGT AATCCCTCATC GTGGGTGGTT CCGTTTTCTC TCTCACCACG TCTCTCTTT
.....

4691 AAGAGCAGTG GGAACGATAG GAGCTATGTT CCTTGGGTTC TTGGGAGCCAG CAGGAAGGCAC TATGGGGCCA
TTCTCGTCAC CCTTGCTATC CTCGATACAA GGAAACCCAAG AACCCCTCGTC GTCCCTTCGTG ATACCCGGGT
.....

4761 CGCTCAATAA CGCTGACGGT ACAGGCCAGA CTATTATTGT CTGGTATACT GCAACAGCAG AACAAATTGCA
CGCAGTTATT GCGACTGCCA TGTCCGGTCT GATAATAACA GACCATATCA CGTTGTCGTG TTGTTAAACG
.....

4831 TGAGGGCTAT TGAGGGCAA CAGGATCTGT TGCAACTCAC AGTCTGGGC ATCAAGCAGC TCCAGGCCAG
ACTCCCGATA ACTCCCGTT GTCGTAGACA ACGTTGAGTG TCAGACCCCC TAGTCGTG AGGTCCGGTC
.....

FIG. 14L

4901 AGTCCTGGCT GTGGAAAGAT ACCTAAGGG A TCAACAGCTC CTAGGGATT GGTTGCTC TGAAACTC
TCAGGACCGA CACCTTCTA TGGATTCCCT AGTTGTCCAG GATCCCTAAA CCCCAACGAG ACCTTTIGAG
.....

4971 ATCTGCACCA CTGCTGTGCC TTGGAATGCC AGTTGGACTA ATAAAACCTCT GGATATGATT TGGGATAACA
TAGACGTGGT CACGACACGG AACCTTACGA TCAACCTCAT TATTTGAGA CCTATACTAA ACCCTATGTT
.....

5041 TGACCTGGAT GGAGTGGGAA AGAGAAATCG AAAATTACAC AGGCTTAATA TACACCTAA TTGAGGAATC
ACTGGACCTA CCTCACCCCTT TCTCTTACG TTTTAATGTC TCCGAATTAT ATGTGGAATT AACTCCCTAG
.....

5111 GCAGAACCAA CAAGAAAGA ATGAAACAAGA CTTATTAGCA TTAGATAAGT GGGCAAGTTT GTGGAATTG
CGTCTTGGTT GTTCTTTCT TACTTGTCT GAATAATCGT AATCTATTCA CCCGGTCAAA CACCTTAACC
.....

5181 TTTGACATAT CAAATTGGCT GTGGTATGTA AAAATCTCA TAATGATAAGT AGGAGGCTTG ATAGGTTAA
AAACTGTATA GTTAAACCGA CACCATACAT TTTTAGAAGT ATTACTATCA TCCTCCGAAAC TATCCAATT
.....

5251 GAATAGTTT TACTGTACTT TCTATAGTAA ATAGAGTTAG GCAGGGATAAC TCACCATTTGT CATTTCAGAC
CTTATCAAAA ATGACATGAA AGATATCAT TATCTCAATC CGTCCCTATG AGTGGTAACA GTAAAGTCTG
.....

FIG. 14M

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5321 CCACCTCCA GCCCCAGGG GACCCGACAG GCCCCAAGGA ATCGAAGAAG AAGGTGGAGA CAGAGACTAA
GGTGGAGGGT CGGGGCTCCC CTGGGCTGTC CGGGCTCTCTC TAGCTTCTCTC TTCCACCTCT GTCTCTGATT

5391 TTTTATGCG GCGGCTGTA CCCAACCTAA AAATTGAAAAA TAAATACAAA GGTCTTGAG GTTGTGTTA
AAAATACGC CGGGGACCAT GGGTTGGATT TTTAACCTTT ATTATATGTTT CCAAGAACCTC CCAACACAAAT

5461 ATTGAAAGC GAGAAATAAT CATAAAATAAG CCCGGGATC CTCTAGACTC GACACCATTG GTCGAGAGC
TTAACTTTCG CTCTTATTAA GTATTATTTC GGGCCCTAG GAGATCTCAG CTGTGGTACC CACGCTCTCG

5531 GTCACTATTAA AGCGGGGAG AATTAGATCG ATGGGAAAAA ATTCCGGTTAA GCCCAGGGGG AAAGAAAAAA
CAGTCATAAT TGGCCCCCTC TTAAATCTAGC TACCCCTTTT TAAGCCAATT CCGGTCCCCC TTTCTTTTTT

5601 TATAAATTAA AACATATAGT ATGGGCAAGC AGGGAGCTAG AACGATTCGC AGTTAATCCT GGCCTCTAG
ATATTAAATT TTGTATATCA TACCCGTTCG TCCCTCGATC TTGCTAAGCG TCAATTAGGA CCGGACAATC

5671 AACACATCAGA AGGCTGTAGA CAAATACTGG GACAGCTACA ACCATCCCTT CAGACAGGAT CAGAAGAACT
TTTGTAGTCT TCCGACATCT GTTATGACC CTGTCGATGT TGTTAGGGAA GTCTGTCTTA GTCTCTCTTGA

FIG. 14N

5741 TAGATCATTA TATAATACAG TAGCACCCCT CTATTGTGTG CATCAAAGGA TAGAGATAAA AGACACCAAG
ATCTAGTAAT ATATTATGTC ATCGTGGGA GATAACACAC GTAGTTCCCT ATCTCTATT TCTGTGTC

5811 GAAGCTTTAG ACAAGATAGA CGAAGAGCAA AACAAAAGTA AGAAAAAAGC ACAGCAAGCA GCAGGCTGACA
CTTCGAATC TGTCTATCT CCTTCTCGTT TTGTTTTCAT TCTTTTTCG TCTCCGTTCTG CGTCGACTGT

5881 CAGGACACAG CA^ATCAAGGTG AGCCAAAATT ACCCTATAGT GCAGAACATC CAGGGGCAA TGGTACATCA
GTCCTGTGTC GTAGTCCAG TCGGTITAA TGGGATATCA CGTCTGTAG GTCCCCGTTT ACCATGTAGT

5951 GGCCATATCA CCTAGAACTT TAAATGGCATG GGTAAAAAGTA GTAGAAGAGA AGGCTTTCAG CCCAGAAGT^G
CCGGTATAGT GGATCTGAA ATTACGTAC CCATTTTCAT CATCTCTCT TCCGAAAAGTC GGGTCTTCAC

6021 ATACCCATGT TTTCAGCATT ATCAGAAGGA GCCACCCAC AAGATTAAA CACCATGCTA AACACAGTGG
TATGGGTACA AAAGTCGTA TAGTCTTCCT CGGTGGGGTG TTCTAAATT GTGGTACGAT TTGTGTCA

6091 GGGGACATCA AGCAGCCATG CAAATGTTAA AAGAGACCAT CAATGAGGAA GCTGCAGAAT GGGATAGAGT
CCCTCTGACT GTGTCGGTAC GTTTACAATT TTCTACTCCCTA CGACCGTCTTA CCCTATCTCA

FIG. 140

6161 **CCATCCAGTC** CATGCCAGGGC CTATTGCCACC AGGCCAGATG AGAGAACCAA CGGGAAGTGA CATAGCAGGA
CCTACGTAC GTACGTCCCC GATAACGTGG TCCGGTCTAC TCTCTTGGTT CCCCTTCAC TGTATCGTCCCT

6231 ACTACTAGTA CCCTTCAGGA ACAAAATAGGA TGGATGACAA ATAATCCACC TATCCCAGTA GGAGAAATT
TGATGATCAT GGGAAAGTCCT TGTTTATCCT ACCTACTGTT ATAGGGTGG ATAGGGTCAAT CCTCTTAA

6301 ATAAAAGATG GATAATCCTG GGATTAATAAA AATAAGTAAG AATGTATAGC CCTACCAGCA TTCTGGACAT
TATTTTCTAC CTATTAGGAC CCTTAATTAT TTACATATTC TTACATATCG GGATGGTGGT AAGACCTGTA

6371 AACACAAGGA CCAAAAGAAC **CCCTTAGACA** CTATGTAGAC CGGTTCTATA AAACTCTAAG AGCCGAGCAA
TTCTGTTCTCTG GTTTTCTG **CGAAATCTCT** GATACATCTG GCCAAGATAT TTTGAGATT TCGGCTCGTT

6441 GCTTCACAGG AGGTAAAAAA TTGGATGACA GAAACCTGT TGGTCCAAAA TGCGAACCCA GATTGTAAGA
CGAACGTGTCCTCC TCCATTTTT AACCTACTGT CTTTGGAACAA ACCAGGTTT ACGGCTTGGGT CTAACATCT

6511 CTATTTAAA AGCATTGGGA CCAGCGGCTA CACTAGAAGA AATGATGACA GCATGTCAGG GAGTAGGAGG
GATAAAATT TCGTAACCCCT GGTGGCCGAT GTGATCTCT TTACTACTGT CGTACAGTCC CTCATCCCT

6581 ACCGGCCAT AAGGCAAGAG TTTGGCTGA AGCAATGAGC CAAGTAACAA ATT~~CAGCTAC~~ CATAATGATG
TGGGGGCTA TTCCGTCTC AAAACCGACT TCGTTACTCC GTTCATTGTT TA~~AGTCATG~~ GTATTACAC

6651 CAGAGGGCA ATTTAGGAA CCAAGAAAG ATT~~CTTAAGT~~ GT~~TTCAAT~~TG TGGCAAAGAA GGGCACACAG
GTCTCTCCGT TAAAATCCTT GGTTCTCTTC TA~~ACAATTC~~ CAAAGTTAAC ACCGGTTCTT CCCGGTGTGTC

6721 CCAGAAATTG CAGGGCCCT AGGAAAAGG CCT~~GTCGAA~~ AT~~GTCGAAAG~~ GAAGGACACC AAATGAAAGA
GGTCTTAAC GTCCCCGGGA TCCTTTTCC CGACA~~ACCT~~ TACACCTTTC CTTACTTCT CTTCTGTGG TTACTTCT

6791 TTGTACTGAG AGACAGGGCTA ATTTTTAGG GAAGATCTGG CCTTCCTACA AGGGAAAGGCC AGGAAATTTC
AACATGACTC TCTGTCCGAT TAAAAATCC CTTCTAGACC GGAAGGATGT TCCCTTCCGG TCCCTTAAAG

6861 CTTCAGAGCA GACCAGAGCC AACAGCCCCA CCAGAAGAGA GCTTCAGGTC TGGGTAGAG ACAACAACTC
GAAGTCTCGT CTGGTCTCGG TTGTCGGGGT GGTCTCTCT CGAAGTCCAG ACCCCATCTC TGTGTGTTGAG

6931 CCCCTCAGAA GCAGGAGCCG ATAGACAAGG AACTGTATCC TTTAACTTCC CTCAGATCAC TCTTTGGCAA
GGGGAGTCTT CGTCCTCGGC TATCTGTCTC TTGACATAGG AAATTGAAGG GAGTCTAGTG AGAAACCGTT

FIG. 14Q

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7001 CGACCCCTCG TCACAATAAA GATAGGGGG CAACTAAAGG AAGCTCTATT AGATACAGGA CGAGATGATA
GCTGGGGAGC AGTGTATTCTT CTATCCCCC GTTGATTTC TTCGAGATAA TCTATGTCCT CGTCTACTAT

7071 CAGTATTAGA AGAAATGAGT TTGCCAGGAA GATGGAAACC AAAAATGATA GGGGAATTG GAGGTTTAT
GTCATAATCT TCTTTACTCA AACGGTCCCT CTACCTTGC TTTTTACTAT CCCCTAAC CTCCAAAATA

7141 CAAAGTAAGA CAGTATGATC AGATACTCAT AGAAATCTGT GGACATAAAG CTATAGGTAC AGTATTAGTA
GTTTCATTCT GTCATACTAG TCTATGAGTA TCTTAGACA CCTGTATTC GATATCCATG TCATAATCAT

7211 GGACCTACAC CTGTCAACAT AATTGGAAGA AATCTGTTGA CTCAGATTGG TTGCACTTA AATTTCCC
CCTGGATGTG GACAGTTGT A TTAACTTCT TTAGACAACT GAGTCTAAC GAGTCTAAC AACGTGAAT TTAAAAGGGT

7281 TTAGCCCTAT TGAGACTGTA CCAGTAAAT TAAAGCCAGG AATGGATGGC CCAAAAGTA ACAATGGCC
AATCGGGATA ACTCTGACAT GGTCAATTAA ATTTCGGTCC TTACCTACCG CGTTTCAAT TTGTTACCG

7351 ATTGACAGAA GAAAAATAA AAGCATTAGT AGAAATTGT ACAGAAATGG AAAAGGAAGG GAAAATTTC
TAACTGTCTT CTTTTTATT TTCGTAATCA TCTTTAACAC TGTCTTTACC TTTTCCTCC CTTTTAAAGT

FIG. 14R

7421 AAAATTGGGC CTGAGAATCC ATACAAATACT CCAGTATTG CCATAAAGAA AAAAGACAGT ACTAAATGGA
TTTTAACCCG GACTCTTACG TATGTTATGA GGTCAATAAAC TGATTTACCT

7491 GGAAATTAGT AGACTTCAGA GAACTTAATA AGAGAACTCA AGACTTCTGG GAAGTTCAAT TAGGAATAACC
CCCTTAATCA TCTAAAGTCT CTTGAATTAT TCTCTTGACT TCTGAAGACC CTTCAAGTTA ATCCTTATGG

7561 ACATCCCCA GGGTTAAAAA AGAAAAAATC AGTAACAGTA CTGGATGTCGG GTGATGCCATA TTTTCAGTT
TGTACGGGT CCCAATTTT TCTTTTTAG TCATTGTCAT GACCTACACC CACTACGTAT AAAAAGTCAA

7631 CCCTTAGATG AAGACTTCAG GAAGTATACT GCATTACCA TACCTAGTAA AACAAATGAG ACACCAGGGA
GGGAATCTAC TTCTGAAGTC CTTCATATGA CGTAAATGGT ATGGATCATA TTTGTACTC TGTGGTCCCT

7701 TTAGATATCA GTACAATGTC CTTCCACAGG GATGGAAAGG ATCACCAGCA ATATTCCAAA GTAGGCATGAC
AATCTATAGT CATGTTACAC GAAGGTGTCCTACCTTCC TACTGCTCGT TATAAGGTTT CATCGTACTG

7771 AAAATCTTA GAGCCTTTA AAAAACAAAAA TCCAGACATA GTTATCTATC AATAACATGAA CGATTGTT
TTTTAGAAT CTCGGAAAAT TTTTTGTTT AGGTCTGTAT CATAGATAG TTATGTAAT GCTAAACATA

FIG. 14S

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL

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7841 GTAGGATCTG ACTTAGAAAT AGGGCAGCAT AGAACAAAAA TAGAGGAGCT GAGACAACAT CTGTTGAGGT
CATCCTAGAC TGAATCTTAA TCCCCTCGTA TCTTGTGTTT ATCTCCCTCGA CTCTCTTGTAA GACAACCTCA

7911 CCCGACTTAC CACACCAGAC AAAAACATC AGAAAGAACCC TCCATTCCCTT TGGATGGGT ATGAAACTCCA
CCCCTGAATG GTGTGGTCTG TTTTGTAG TCTTCTGG AGGTAAAGGAA ACCTACCCAA TACTTGAGGT

7981 TCCTGATAAA TGGACACAGTAC AGCCTATAGT GCTGCCAGAA AAAGACAGCT GGACTGTCAA TGACATACAG
AGGACTATT ACCTGTCACT CGGGATATCA CGACGGTCTT TTTCTGTCAA CCTGACAGTT ACTGTATGTC

8051 AAGTTAGTGG CGAAATTGAA TACCGCAAGT CAGATTACC CAGGGATTAA AGTAAGGCCAA TTATGTAAC
TTCATCACC CCTTAACTT ATGGCGTCA GTCTAAATGG GTCCCCTAATT TCATTCGGT AATACATTG

8121 TCCTTAGGG AACCAAAGCA CTAACAGAAC TAATACCACT AACAGAGAA GCAGAGCTAG AACTGGCAGA
AGGAATCTCC TTGGTTTCCT GATTGTCCTTC ATTATGGTGA TTGTCCTCTT CGTCTCCATC TTGACCCGTCT

8191 AACACAGAG ATTCTAAAAG AACCAAGTACA TGGAGTGTAT TATGACCCAT CAAAAGACTT AATAGCAGAA
TTTGTCTCTC TAAGATTTC TTGGTCTATGT ACCTCACATA ATACTGGTAA GTTTCTGAA TTATCGTCTT

FIG. 14T

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL
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8261 ATACAGAACG AGGGCAAGG CCAATGGACA TATCAAATT TATCAAGAGC ATTAAAAAT CTGAAACAG
TATGTCTTCG TCCCCGTTCG GGTTACCTCC ATAGTTAA TAGTTCTCGG TAAATTTTA GACTTTTGTGTC

8331 GAAATATGCC AAGAATGAGG GGTGCCACA CTAATGATGT AAAACATTAA ACAGAGGCAG TGCAGAAAT
CTTTTATACG TTCTTACTCC CCACGGGTGT GATTACTACA TTTTGTAAAT TGTCTCCGTC ACGTTTTTA

8401 AACACAGAA AGCATAGTAA TATGGGGAAA GACTCCTAA TTAAACTAC CCATACAAA GGAAACATGG
TTGGTGTCTT TCGTATCATT ATACCCCTT CTGAGGATT AAATTGATG GGTATGTTT CCTTTGTAC

8471 GAAACATGGT GGACAGAGTA TTGGCAAGGCC ACCTGGATTC CTGACTGGGA GTTTGTAAAT ACCCCTCCTT
CTTTGTACCA CCTGTCTCAT AACCGGTTCGG TGGACCTAAG GACTCACCCCT CAAACAATTAA TGCGGAGGAA

8541 TAGTCAAATT ATGGTACAG TTAGAGAAAG AACCCATACT AGGAGCAGAA ACCTCTATG TAGATGGGGC
ATCACTTTAA TACCATGTC AATCTCTTC TTGGGTATCA TCCTCGTCTT TGGAAGATAC ATCTACCCCG

8611 AGCTAACAGG GAGACTAAAT TAGGAAAGC AGGATATGTT ACTAACAAAG GAAGACAAA GGTTGTCCCC
TCGATTGTCC CTCTGATTTA ATCCTTTTCG TCCTATACAA TGATTGTTTC CTTCTGTTT CCAACAGGGG

FIG. 14U

8681 CTAACAACA CAACAATCA GAAACTCAG TTACAAGCAA TTTATCTAGC TTGAGGATT TAG
GATTGATTGT GTTGTCTAGT CTTTGTAGC AATGTTCTT AAATAGATCG AACGTCCTA AGTCCTAATC

8751 AAGTAAACAT ACTAACAGAC TCACAAATATG CATTCAAGCA CAACCAAGATA AAAGTGAATC
TTCATTGTA TCATTGTCAG AGTGTATAC GTAATCCCTA GTAAGTTCGT GTTGGTCTAT TTTCACITAG

8821 AGAGTTAGTC AATCAAATAA TAGAGCCAGTT AATAAAAAAG GAAAGGTCT ATCTGGCATG GGTACCCAGCA
TCTCAATCAG TTAGTTTATT ATCTCGTCAA TTATTTTC CTTTCCAGA TAGACCGTAC CCATGGTCGT

8891 CACAAAGGAA TTGGAGGAAA TGAACAAAGTA GATAAAATTAG TCAGTGCTGG AATCAGGAAA ATACTATTT
GTGTTCCCTT AACCTCTTT ACTTGTTCAT CTATTTAATC AGTCACGGACC TTAGTCCTT TATGATAAAA

8961 TAGATGGAAT AGATAAGGCC CAAGATGAAC ATTAGTTTT ATGTCGCACCT GCAGGGAAAG TTTTATAGGT
ATCTACCTTA TCTATTCCGG GTTCTACTTG TAATCAAAAA TACAGCTGGA CGTCCTTTC AAAATATCCA

9031 AGTGTAGA ACAAAATACA TAATTTGTA AAAATAATC ACTTTTATA CTAATATGAC ACGATTACCA
TCAACTATCT TGTTTTATGT ATTAAACAT TTTTATTAG TGAAAATAT GATTATACTG TGCTAATGGT

FIG. 14V

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL

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9101 ATACTTTGT TACTAATATC ATTAGTATAAC GCTACACCTT TTCCTCAGAC ATCTAAAAAA ATAGGTGATG
TATGAAACA ATGATTATAG TAATCATATC CGATGTCGAA AAGGAGTCTG TAGATTTTT TATCCACTAC

9171 ATGCAAACTTT ATCATGTAAT CGAAATAATA CAAATGACTA CGTTGTTATG AGTGCTTGCT ATAAGGAGCC
TACGTTGAAA TAGTACATTA GCTTATTAT GTTACTGAT GCAACATAAC TCACGAACCA TATTCCCTCGG

9241 CAATTCCATT ATTCTTTAG CTGCTAAAC CGACCGCTCTTG TATTTCGATA ATTATACCAA GGATAAAATA
GTTAAGGTTAA TAAGAAAATC GACGGATTTC GCTGGAGAAC ATAAAACAT TAATATGGTT CCTATTATAT

9311 TCTTACGACT CTCCATACGA TGATCTAGTT ACAACTATCA CAATTAAATC ATTGACTGCT AGAGATGCCG
AGAATGCTGA GAGGTATGCT ACTAGATCAA TGTGTGATAGT GTTAATTAG TAACTGACCA TCTCTACGGC

9381 GTACTTATGT ATGTGCATTG TTTATGACAT CGCCTACAAA TGACACTGAT AAAGTAGATT ATGAAGAATA
CATGAATAACA TACACGTTAA GAAATACTGTA GCGGATGTTT ACTGTGACTA TTTCATCTAA TACTTCTTAT

9451 CTCCACAGAG TTGATTGTTAA ATACAGATAG TGATCGACT ATAGACATAA TACTATCTCG ATCTACACAT
GAGGTGTCTC AACTAACATT TATGTCTATC ACTTAGCTGA TATCTGTATT ATGATAGACCA TAGATGTGTA

FIG. 14W

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL
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9521 TCACCAAAA CTAGTTAACCC TTGTCTCCCT ATAGTGAGTC GTATTAGAGC TTGGCGTAAT CATGGTCATA
ACTGGTCTTT GATCAATTG AACAGAGGA TATCACTCAG CATAATCTCG AACCGCATTAA GTACCACTAT

9591 GCTGTTCCCT GTGTGAAATT GTTATCCGCT CACAAATTCCA CACAACATAC GAGCCGGAAG CATAAAGTGT
CGACAAAGGA CACACTTAA CAATAGCGA GTGTTAAGCT GTGTTGATG CTCGGCCTTC GTATTCACAA

9661 AAAGCCTGGC GTGCCCTAAC AGTGAGCTAA CTCACATTAAT TTGCGTGTGCG CTCACTGCC C GCTTTCGAGT
TTTCGGACCC CACGGATTAC TCACTCGATT GAGTGTAAATT AACGGCAACGC GACTGACGGG CGAAAGCTCA

9731 CGGGAAACCT GTCGTGCCAG CTGCATTAAT GAATCGGCCA ACCGGGGGG AGAGGGGGTT TGCGTATTGG
GCCCTTTGGA CAGCACGGTC GACGTAATTAA CTTAGCCGATT AACGGCAACGC GACTGACGGG CGAAAGCTCA

9801 GCGCTCTTCC GCTTCCTCGC TCACTGACTC GCTGCCCTCG GTCGTTCGGC TGGGGCGAGC GGTATCAGCT
CGCGAGAAAGG CGAAGGAGCG AGTGACTGAG CGACGGCAGC CAGCAAGCCG ACGCCGGCTCG CCATAGTCGA

9871 CACTCAAAGG CGGTAATAACG GTTATCCACA GAATCAGGG ATAACGCCAGG AAAGAACATG TGAGCAAAAG
GTGAGTTCC GCCATTATGCC CAATAGGTGT CTTAGTCCCC TATTGGCTCC TTTCTGTAC ACTCGTTTC

9941 GCCAGCAAAA GGCCAGGAAC CGTAAAAGG CGCGCTTGCT GGCCTTTTC GATAGGCTCC GCCCCCTGA
CGGTGTTT CCGGTCTTC GCATTTC GCATTTG CGCAACGA CGGCAAAAG CTATCCGAGG CGGGGGGACT

FIG. 14X

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL

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10011 CGAGCATCAC AAAATCCGAC GCTCAAGTCA GAGGTGGCGA AACCCGACAG GACTATAAG ATACCAGGGC
GCTCGTAGTC TTTTAGCTG CGAGTTCAGT CTCCACCCGCT TTGGGCTGTC CTGATATTTC TATGGTCCGC

10081 TTTCCCCCTG GAAGCTCCCT CGTGCGCTCT CCTGTTCCGA CCCTGCCGCT TACCGATAAC CTGTCGGCCT
AAAGGGGAC CTTGGGCGA GCACGGAGA GGACAAAGGCT GGACGGCGA ATGGCCATAG GACAGGGGA

10151 TTCTCCCTTC GGGAAAGCGTG GCGCTTCTC ATAGCTCACG CTGTTAGGTAT CTCAGTTCGG TGTAGGTCGT
AAGAGGGAAG CCCTTCGAC CGCGAAAGAG TATCGAGTGC GACATCCATA GAGTCAAAGCC ACATCCAGCA

10221 TCGCTCCAAG CTGGGCTGTG TGCACCAACC CCCCGTTCAAG CCCGACCCGCT GGCCTTATC CGGTAACAT
AGCGAGGTTCA GACCCGACAC ACGTGCTTGG GGGCAAGTC GGGCTGGCA CGCGGAATAG CCCATTGATA

10291 CGTCTTCACT CCAACCCGGT AAGACACCGAC TTATGCCAC TGGCACCAAC CACTGTAAC AGGATTAGCA
GCAGAACTCA GGTGGCCA TTCTGTGCTG AATAGCGGTG ACCGCTGTCG GTGACCATTC TCCTAATCGT

10361 GAGCGAGGTA TGTAGGCCGT GCTACAGACT TCTTGAAGTG GTGGCCTAAC TACGGCTACA CTAGAAGGAC
CTCGCTCCAT ACATCCGCCA CGATGTCTCA AGAACTTCAC CACCGGATTG ATGCCGATGT GATCTTCCGT

10431 AGTATTTGGT ATCTGGGCTC TGCTGAAGCC AGTTACCTTC GGAAAAGAG TTGGTAGCTC TTGATCCGGC
TCATAAACCA TAGACGGAG ACCACTTCGG TCAATGGAAG CCTTTTCTC AACCATCGAG AACATAGGGCG

FIG. 14Y

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL
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10501 AAACAAACCA CCGCTGGTAG CGGTGGTTT TTGTTGGCA AGCAGCAGAT TACCGCCAGA AAAAACGGAT
TTGTTGCT GCGGACCATC GCCACAAA AACAAACGT TCGTCGCTA ATGGCGCTA TTTTTCCCTA

10571 CTCAGAAGA TCCTTGATC TTTTCTACGG GGTCTGACGC TCAGTGGAAC GAAAACCTCAC GTTAAGGGAT
GAGTCTCT AGGAAACTAG AAAAGATGCC CCAGACTGGC AGTCACCTTG CTTTGAGTG CAATTCCCTA

10641 TTGGTCTG AGATTCAA AAAGGATCTT CACCTAGATC CTTAAATT AAAATGAAG TTTAAATCA
AAACCAGTAC TCTAATAGTT TTTCCCTAGAA GTGGATCTAG GAAAATTAA TTTTACTC AAAATTAGT

10711 ATCTAAAGTA TATATGAGTA AACTTGGTCT GACAGTTACC AATGCTTAAT CAGTGAGGCC CCTATCTCAG
TAGATTCAT ATACTCAT TTGAAACCAGA CTGTCATGG TTACGAATTA GTCACTCCGT GGATAGTC

10781 CGATCTGTCT ATTTCTTCA TCCATAGTTG CCTGACTCCC CGTCGTGTAG ATAACACCA TACGGGAGGG
GCTAGACAGA TAAAGCAAAGT AGGTATCAAC GGACTGAGGG GCAGCACATC TATTGATGCT ATGCCCTCCC

10851 CTTACCATCT GGCCCCAGTG CTGCAATGAT ACCGGGAGAC CCACGGCTCAC CGGCTCCAGA TTATCAGCA
GAATGGTACA CCGGGGTACAC GACCTTACTA TGGCGCTCTG GGTGGAGTG GCGGAGGTCT AAATAGTCGT

10921 ATAAACAGC CAGCCGGAAAG GGGCGAGGC AGAAAGTGTCT CTGCAACTTT ATCCGGCTCC ATCCAGTCTA
TATTTGGTCC GTCGGGCTTC CCGGGCTGGC TCCTCACAG GACGTTGAAA TAGGGGAGG TAGGTCAAGAT

FIG. 14Z

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL

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10991 TTAATTGTTG CCGGGAAGCT AGAGTAAGTA GTTCGCCAGT TAATAGTTG CGCAACGTTG TTGGCATTG
AATTAACAC GGCCTTCGA TCTCATTCAAT CAGGGGTCA ATTATCAAAC AACCGTAACG

11061 TACAGGCATC GTGGTGTAC GCTCCGTGTT TGCTATGGCT TCATTAGCT CCGGTTCCCA ACGATCAA
ATGTCCTAG CACCACTAG CGAGCAGCA ACCATACCGA AGTAAGCTGA GGCCAAAGGGT TGCTAGTTCC

11131 CGAGTTACAT GATCCCCAT GTTGTGCAA AAAGGGTTA GCTCCTTCGG TCCTCCGATC GTGTCAGAA
GCTCAATGTA CTAGGGGTAA CAACACGTTT TTTCGCCAAAT CGAGGAAGCC AGGAGGCTAG CAACAGTCTT

11201 GTAAGTTGGC CGCAGTGTAA TCACTCATGG TTATGGCAGC ACTGCATAAT TCTCTTACTG TCATGCCATC
CATTCACCG GCGTCACAAAT AGTGAGTACCA AATACCGTTC TGACGTTAA AGAGAATGAC AGTACGGTAG

11271 CGTAAGATGC TTTTCTGTCA CTGGTCAAGT CTCACCAAG TCATTCTGAG AATAGTGTAT CGGGGACCG
GCATTCTACG AAAAGACACT GACCACTCAT GAGTTGGTTC AGTAAGACTC TTATCACATA CGGGGCTGGC

11341 AGTGGCTCTT GCGGGCGTC AATAACGGGAT AATACGGG CACATAGCAG AACTTTAAA GTGCTCATCA
TCAACGAGAA CGGGGGCAG TTATGCCCTA TTATGCCCTA TTATGCCCTC TTGAAATTG CACGAGTAGT

FIG. 14AA

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL

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11411 TTGGAAACG TTCTCCCCG CGAAACTC CAAGGATCTT ACCGGCTGTTG AGATCCAGTT CGATGTAACC
ACCTTTGC AGAACCCCC GCTTGTGACA GTTCCTAGAA TGGGACAAC TCTAGGTCAA GCTACATTGG

11481 CACTCGTCCA CCCAACTGAT CTTCAGCATC TTTTACTTTC ACCAGCGTTT CTGGGTGAGC AAAAACAGGA
GTGAGCACGT GGCTTCACTA GAAGTCGTAG AAAATGAAAG TGGTCCAAA GACCCACTCG TTTTTGTCTCT

11551 AGGCAAAATG CCGCAAAAAA GGGATAAAGG GGGACACAGGA AATGTTGAAT ACTCATACTC TTCCCTTTTC
TCCGTTTAC GGGTTTTT CCCTTATTCC CGCTGTGCT TTACAACTTA TGAGTATGAG AGGAAAAG

11621 AATATTATG AAGCATTTAT CAGGGTTATT GTCTCATGAG CGGATACATA TTTGAATGTA TTAGAAAAA
TTATAAAC TTCGTAATAA GTCCCCATAA CAGAGTACTC GCCTATGTAT AAACCTTACAT AAATCTTTT

11691 TAAACAAATA GGGTTCCGC GCACATTCC CCCAAAAGTG CCACCTGACG TCTAAGAAC CATTATTATC
ATTGTGTTAT CCCAAGGGC CGTGTAAAGG GGCTTTACAC GGTGGACTGC AGATTCCTTG GTAATAATAG

11761 ATGACATTAA CCTATAAAA TAGGCGTATC ACCAGGCCCT TTCGTCCTCGC CGGTTTGGT GATGACCGGT
TACTGTAATT CGATATTTT ATCCGCATAG TGCTCCGGAA AAGCAGAGCG CGCAAAGCCA CTACTGCCAC

FIG. 14AB

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL

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11831 AAAACCTCTG ACACATGGAG CTCCCCGAGA CGGTACACAGC TTGTCTGTAA ECGGATGCCG GGAGCAGACA
TTTGGAGAC TGTGTACGTC GAGGGCTCTT GCCAGTGTG AACAGACATT CGCCTACGCC CCTCGTCTGT

11901 AGCCCCGTCAAG GGCGCGTCAAG CGGGTGTGCG CGGCTGGCTTA ACTATGCCGC ATCAGAGCCAG
TCGGGCAGTC CGGGCAGTC GCCACACACC GCCACACGCC CCGACCGAAT TGATACGCCG TAGTCTCGTC

11971 ATTGTACTGA GAGTGCACCA TATGCCGTGT GAAATAACCGC ACAGATGCCGT AAGGAGAAAA TACCGGCATCA
TAACATGACT CTCACGTTGGT ATACGCCACA CTTTATGGCG TGTCTACGCA TTCCCTCTTT ATGGCGTAGT

12041 GGCCCCATTC GCATTCAAGG CTGCCCAACT GTTGGGAAGG GCGATCGGTG CGGCCTCTT CGCTATTACG
CCGGGGTAAG CGGTAAAGTCC GACGGCTTGA CAACCCCTTC CGCTAGCCAC GCCGGAGAA CGATAATGC

12111 CCAGCTGGCG AAAGGGGAT GTGCTGCAAG GCGATTAAGT TGGGTAACGC CAGGGTTTC CCAGTCACGA
GGTCCACCCG TTCCCCCTTA CACGACGTTCA CGCTAATTCA ACCCATGCG GTCCCAAAG GGTCAAGTGCT

12181 CGTTGTAAAA CGACGGCCAG TGAATTGGAT TTAGGTGACA CTATA
GCAACATTT GCTGGGGTC ACTTAACCTA AATCCACTGT GATAT

FIG. 14AC

Text File of pLW-48 and the Included Individual HIV Genes and Their Promoters

Entire pLW-48 plasmid sequence:

GAATTCTGGTGGCGCCATGGATGGTATTGTATACTGTCTAACGCG
TTAGTAAAACATGGCGAGGAAATAATCATATAAAAATGATTCTATGATTAA
ACCATGTTGTGAAAAAGTCAAGAACGTTCACATTGGCGGACAATCTAAAAC
AATAACAGTATTGCCAGATTGCCATATATGGATAATGCGGTATCCGATGTAT
GCAATTCACTGTATAAAAAGAATGTATCAAGAATATCCAGATTGCTAATTG
ATAAAAGATAGATGACGATGACAAGACTCCTACTGGTGTATATAATTATTTAA
ACCTAAAGATGCCATTCCGTATTATATCCATAGGAAAGGATAGAGATGTTT
GTGAACATTAAATCTCATCTGATAAAGCGTGTGCGTGTAGAGTTAAATTCA
TATAAAAGTAGCCATTCTCCATGGATGTTCTCTTTACCAAAGGAAATGC
ATCATTGATTATTCTCCTGTTATTCTATCGATGCGGCACCTCTCTAA
GAAGTGTAAACCGATAATAATGTTATTATATCTAGACACCAGCGTCTACATGA
CGAGCTTCCGAGTTCCAATTGGTTCAAGTTTACATAAGTATAAAAGTCCGAC
TATTGTTCTATATTATATGGTTGTGATGGATCTGTGATGCATGCAATAGC
TGATAATAGAACTTACGCAAATTAGCAAAATATTAGACAATACTACAA
TTAACGATGAGTGTAGATGCTGTTATTGAACCACAGATTAGGATTCTGAT
AGAGATGAGATGCTCAATGGATCATCGTGTGATATGAACAGACATTGTATT
TGATGAATTACCTGATGTAGGCGAATTGGATCTAGTATGTTGGGAAATA
TGAACCTGACATGATTAAGATTGCTCTTCGGCTGGTACCGCGCG
CCTTCATTTGTTTCTATGCTATAAATGGTACGTCTGTAGAAACCCC
AACCCGTGAAATCAAAACTCGACGGCTGTGGCATTAGTCTGGATCG
CGAAAACGTGGAATTGATCAGCGTGGGGAAAGCGCGTTACAAGAAAG
CCGGGCAATTGCTGTGCCAGGCAGTTAACGATCAGTCGCCGATGCGA
TATTGTAATTATGCCGGCAACGTCTGGTATCAGCGCGAAGTCTTATACCG
AAAGGTTGGCAGGCCAGCGTATCGTGTGCTGCGTTGATGCGGTACTCAT
TACGGCAAAGTGTGGGTCAATAATCAGGAAGTGTGGAGCATCAGGGCGG
CTATACGCCATTGAAGCCGATGTCACGCCGTATGTTATTGCCGGAAAAG
TGTACGTATCACCCTTGTGTAACAACGAACACTGGCAGACTATCCC
GCCGGGAATGGTATTACCGACGAAAACGGCAAGAAAAGCAGTCTTACTT
CCATGATTCTTAACTATGCCGGAAATCCATCGCAGCGTAATGCTCTACACC
ACGCCGAACACCTGGGTGGACGATATCACCCTGGTGGCAGCATGTCGCGCA
AGACTGTAACCACCGCTGTGACTGGCAGGTGGTGGCCAATGGTGT
CAGCGTTGAACCTGCGTGTGCGGATCAACAGGTGGTGTGCAACTGGACAAG
GCACTAGCGGGACTTGTGCAAGTGGTGAATCCGCACCTCTGGCAACCGGGT
GAAGGTTATCTCTATGAACTGTGCGTCACAGCCAAAAGCCAGACAGAGTGT
GATATCTACCCGCTTCGCGTCGGCATCCGGTCAGTGGCAGTGAAGGGCGA
ACAGTTCCTGATTAACCACAAACCGTTCTACTTACTGGCTTGGTGTGTCAT
GAAGATGCGGACTTGCCTGGCAAAGGATTGATAACGTGCTGTGGTGCAC
GACCACGCATTAATGGACTGGATTGGGGCCAACCTCCTACCGTACCTCGCAT
TACCCCTACGCTGAAGAGATGCTCGACTGGCAGATGAACATGGCATCGTG

GTGATTGATGAAACTGCTGCTGGCTTAACCTCTCTTAGGCATTGGTT
 TCGAAGCGGGCAACAAGCCGAAAGAAACTGTACAGCGAAGAGGGAGTCAC
 GGGGAAACTCAGCAAGCGCACTTACAGGCAGTAAAGAGCTGATAGCGCGT
 GACAAAAACCACCCAAGCGTGGTATGTGGAGTATTGCCAACGAACCGGAT
 ACCCGTCCGCAAGGTGCACGGGAATATTGCGGCCACTGGCGGAAGCAAC
 GCGTAAACTCGACCCGACCGTCCGATCACCTGCGTCAATGTAATGTTCTG
 CGACGCTCACACCGATACCATCAGCGATCTCTTGATGTGCTGTGCCTGAA
 CCGTTATTACGGATGGTATGTCCAAAGCGGCGATTGGAAACGGCAGAGAA
 GGTACTGGAAAAAGAACTTCTGGCCTGGCAGGAGAAACTGCATCAGCCGAT
 TATCATCACCGAATACGGCGTGGATACGTTAGCCGGGCTGCACTCAATGTA
 CACCGACATGTGGAGTGAAGAGTATCAGTGTGCATGGCTGGATATGTATCA
 CCGCGTCTTGATCGCGTCAGCGCCGTCGTGGTGAACAGGTATGGAATT
 CGCCGATTTGCGACCTCGCAAGGCATATTGCGCGTGGCGGTAAACAAGAA
 AGGGATCTTCACTCGCACCGCAAACCGAAGTCGGCGGCTTCTGCTGCA
 AAAACGCTGGACTGGCATGAACCTCGGTAAAAACCGCAGCAGGGAGGCA
 ACAATGAGAGCTCGGTTGATGGATCTGTGATGCATGCAATAGCTGATA
 ATAGAACTTACGCAAATATTAGAAAAATATATTAGACAATACTACAATTAAAC
 GATGAGTGTAGATGCTGTTATTTGAACCACAGATTAGGATTCTGATAGAG
 ATGAGATGCTCAATGGATCATCGTGTGATATGAACAGACATTGTATTATGAT
 GAATTACCTGATGTAGGCGAATTGGATCTAGTATGTTGGGAAATATGAA
 CCTGACATGATTAAGATTGCTCTTGGTGGCTGGCGCCGCTCGAGTAA
 AAAATGAAAAAATATTCTAATTATAGGACGGTTGATTTCTTTCTAT
 GCTATAATAATAATAGCGGCCGACCATGAAAGTGAAGGGGATCAGGAA
 GAATTATCAGCACTGTGGAAATGGGCATCATGCTCCTGGATGTTGATG
 ATCTGTAGTGCTGTAGAAAATTGTGGTCACAGTTATTATGGGTACCTG
 TGTGGAAAGCAACCACCACTCTATTGTCATCAGATGCTAAAGCATA
 TGATACAGAGGTACATAATGTTGGCCACACATGCCGTGTACCCACAGA
 CCCCACCCACAAGAAGTAGTATTGGAAAATGTGACAGAAAATTAAACATG
 TGGAAAAATAACATGGTAGAACAGATGCATGAGGATATAATCAGTTATGGG
 ATCAAAGCCTAAAGCCATGTGTAAAATTAAACCCACTCTGTGTTACTTAAAT
 TGCAC TGATTGAGGAATGTTACTAATATCAATAAGTAGTGAGGGAATGA
 GAGGAGAAATAAAAATGCTCTTCAATATCACCACAGCATAAGAGATAA
 GGTGAAGAAAGACTATGCACTTTTATAGACTTGATGTAGTACCAATAGATA
 ATGATAATACTAGCTATAGGTTGATAAATTGTAATACCTCAACCATTACACAG
 GCCTGTCAAAGGTATCCTTGAGCCAATTCCACATCATTATTGTACCCGG
 CTGGTTTGCGATTCTAAAGTGTAAAGACAAGAAGTTCAATGGAACAGGGCC
 ATGTAAAAATGTCAGCACAGTACAATGTACACATGGAATTAGGCCAGTAGTG
 TCAACTCAACTGCTGTTAAATGGCAGTCTAGCAGAAGAAGAGGTAGTAATTA
 GATCTAGTAATTTCACAGACAATGCAAAAACATAATAGTACAGTTGAAAGAA
 TCTGTAGAAATTAAATTGTAACAGACCCAAACAACAATACAAGGAAAAGTATA
 ATATAGGACCAGGAAGAGCATTATACAACAGGAGAAATAATAGGAGATAT
 AAGACAAGCACATTGCAACATTAGTAGAACAAAATGGAATAACACTTAAAT
 CAAATAGCTACAAAATTAAAAGAACAAATTGGGAATAATAAAACAATAGTCTT
 TAATCAATCCTCAGGAGGGACCCAGAAATTGTAATGCACAGTTAATTGT
 GGAGGGAAATTCTTCTACTGTAATTCAACACAACGTGTTAATAGTACTTGG
 ATTGTAATGGTACTTGGAAATTAAACACAATCGAATGGTACTGAAGGAAATGA

CACTATCACACTCCCATGTAGAATAAAACAAATTATAAATATGTGGCAGGAA
 GTAGGAAAAGCAATGTATGCCCTCCCATCAGAGGACAAATTAGATGCTCAT
 CAAATATTACAGGGCTAATATTAACAAGAGATGGTGGAACTAACAGTAGTGG
 GTCCGAGATCTTCAGACCTGGGGAGGGAGATATGAGGGACAATTGGAGAA
 GTGAATTATATAAATATAAAGTAGTAAAAATTGAACCATTAGGAGTAGCACCC
 ACCAAGGCAAAAGAAGAGTGGTGCAGAGAGAAAAAGAGCAGTGGAAC
 GATAGGAGCTATGTCCTTGGGTTCTTGGGAGCAGCAGGAAGCACTATGGG
 CGCAGCGTCAATAACGCTGACGGTACAGGCCAGACTATTATTGTCTGGTAT
 AGTGCAACAGCAGAACAAATTGCTGAGGGCTATTGAGGCGAACAGCATCT
 GTTGCAACTCACAGTCTGGGCATCAAGCAGCTCCAGGCAAGAGTCCTGG
 CTGTGGAAAGATACTAACGGATCAACAGCTCCTAGGGATTGGGTTGCT
 CTGGAAAACTCATCTGCACCACTGCTGTGCCCTGGAATGCTAGTTGGAGTA
 ATAAAACCTGGATATGATTGGATAACATGACCTGGATGGAGTGGAAA
 GAGAAATCGAAAATTACACAGGCTTAATATACACCTTAATTGAGGAATCGCA
 GAACCAACAAGAAAAGAATGAACAAAGACTTATTAGCATTAGATAAGTGGGCA
 AGTTTGTGGAATTGGTTGACATATCAAATTGGCTGTGGTATGAAAAATCTT
 CATAATGATAGTAGGAGGCTTGATAGGTTAAGAATAGTTTACTGTACTTT
 CTATAGTAAATAGAGTTAGGCAGGGACTCACCATTGTCAATTGACACCCA
 CCTCCCAGCCCCGAGGGGACCCGACAGGCCGAAGGAATCGAAGAAGAAG
 GTGGAGACAGAGACTAATTATGCGGCCGCTGGTACCCAACCTAAAAATT
 GAAAATAAATACAAAGGTTCTGAGGGTTGTAAATTGAAAGCGAGAAAT
 AATCATAAATAAGCCCCGGGATCCTCTAGAGTCGACACCATTGGTGCAGA
 GCGTCAGTATTAAGCAGGGGAGAATTAGATCGATGGGAAAAATTGGTTA
 AGGCCAGGGGGAAAGAAAAATATAAATTAAAACATATAGTATGGCAAGCA
 GGGAGCTAGAACGATTGCAAGTTAACCTGGCCTGTTAGAAACATCAGAAC
 GCTGTAGACAAATACTGGGACAGCTACAACCATCCCTCAGACAGGATCAG
 AAGAACTTAGATCATTATATAATACAGTAGCAACCCCTCTATTGTGTGCATCAA
 AGGATAGAGATAAAAGACACCAAGGAAGCTTAGACAAGATAGAGGAAGAG
 CAAAACAAAAGTAAGAAAAAGCACAGCAAGCAGCAGCTGACACAGGACAC
 AGCAATCAGGTCAAGCCAAAATTACCTATAGTCAGAACATCCAGGGCAA
 ATGGTACATCAGGCCATATCACCTAGAACTTAAATGCATGGTAAAGTAG
 TAGAAGAGAAGGCTTCAGCCCAGAAAGTGTACCCATTGTTTCAGCATTATC
 AGAAGGAGCCACCCACAAGATTAAACACCATGCTAAACACAGTGGGGGG
 ACATCAAGCAGCCATGCAAATGTTAAAGAGACCATCAATGAGGAAGCTGC
 AGAATGGTAGAGTCATCCAGTGCATGCAGGGCTATTGCACCAAGGCCA
 GATGAGAGAACCAAGGGGAAGTGACATAGCAGGAACTACTAGTACCCATTCA
 GGAACAAATAGGATGGATGACAAATAATCCACCTATCCCAGTAGGAGAAATT
 TATAAAAGATGGATAATCCTGGGATTAAATAAAATAGTAAGAATGTATAGCCC
 TACCAAGCATTCTGGACATAAGACAAGGACCAAAAGAACCCATTAGAGACTAT
 GTAGACCGGTTCTATAAAACTCTAAGAGCCGAGCAAGCTTCACAGGAGGTA
 AAAAATTGGATGACAGAAACCTTGTGGTCCAAATGCGAACCCAGATTGTA
 AGACTATTAAAAGCATTGGGACCAGCGGCTACACTAGAAGAAATGATGAC
 AGCATGTCAGGGAGTAGGAGGACCCGGCCATAAGGCAAGAGTTTGGCTG
 AAGCAATGAGCCAAGTAACAAATTCACTACCATATAATGATGCAGAGAGGCA
 ATTTTAGGAACCAAAAGAAAGATTGTTAAGTGTTCATTGTGGCAAAGAAGG
 GCACACAGCCAGAAATTGCAGGGCCCTAGGAAAAAGGGCTGTTGGAAAT

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GTGGAAAGGAAGGACACCAATGAAAGATTGTACTGAGAGACAGGCTAATT
TTTAGGGAAGATCTGGCCTTCCTACAAGGGAGGCCAGGGATTCTCA
GAGCAGACCAGAGCCAACAGCCCCACCAGAAGAGAGCTTCAGGTCTGGGG
TAGAGACAACAACCTCCCCCTCAGAAGCAGGAGGCCAGAAGAGACTGT
ATCCTTAACTCCCTCAGATCACTCTTGGCAACGACCCCTCGTCACAATA
AAGATAGGGGGCAACTAAAGGAAGCTCTATTAGATACAGGAGCAGATGAT
ACAGTATTAGAAGAAATGAGTTGCCAGGAAGATGGAAACCAAAATGATAG
GGGGATTGGAGGTTTATCAAAGTAAGACAGTATGATCAGATACTCATAGA
AATCTGTGGACATAAGCTATAGGTACAGTATTAGTAGGACCTACACCTGTC
AACATAATTGGAAGAAATCTGTTGACTCAGATTGGTTGCACCTAAATTCC
CATTAGCCCTATTGAGACTGTACCAAGTAAAATTAAAGCCAGGAATGGATGGC
CCAAAAGTTAAACAATGGCCATTGACAGAAGAAAAAATAAAAGCATTAGTAG
AAATTGTACAGAAATGGAAAAGGAAGGGAAAATTCAAAAATTGGGCCTGA
GAATCCATACAATACTCCAGTATTGCCATAAAGAAAAAGACAGTACTAAAT
GGAGGAAATTAGTAGATTCAAGAGAACCTTAATAAGAGAACTCAAGACTCTG
GGAAGTTCAATTAGGAATACCACATCCCGCAGGGTAAAAAGAAAAATCA
GTAACAGTACTGGATGTGGGTGATGCATATTTCAGTTCCCTAGATGAAG
ACTTCAGGAAGTACTGCATTACCATACCTAGTATAACAATGAGACACC
AGGGATTAGATATCAGTACAATGTGCTCCACAGGGATGGAAAGGATCACC
AGCAATATTCCAAAGTAGCATGACAAAAATCTAGAGCCTTAAAAACAAA
ATCCAGACATAGTTATCAATACATGAACGATTGTATGTAGGATCTGAC
TTAGAAATAGGGCAGCATAAGAACAAAATAGAGGAGCTGAGACAAACATCTG
TTGAGGTGGGACTTACACACCAAGACAGCTGGACTGTCAATGACATACAGAAGTTAG
TGGGGAAATTGAATACCGCAAGTCAGATTACCCAGGGATTAAAGTAAGGC
AATTATGTAAACTCCTAGAGGAACCAAGCACTAACAGAAGTAATACCACT
AACAGAAGAAGCAGAGCTAGAACTGGCAGAAAACAGAGAGATTCTAAAAGA
ACCAAGTACATGGAGTGTATTATGACCCATCAAAAGACTTAATAGCAGAAATA
CAGAAGCAGGGCAAGGCCAATGGACATATCAAATTATCAAGAGCCATT
AAAAATCTGAAAACAGGAAAATATGCAAGAATGAGGGGTGCCACACTAAT
GATGTAAAACAATTACAGAGGCAGTGCAAAAAATAACCACAGAAAGCATAG
TAATATGGGAAAGACTCCTAAATTAAACTACCCATACAAAGGAAACATG
GGAAACATGGTGGACAGAGTATTGGCAAGCCACCTGGATTCTGAGTGGGA
GTTTGTAAATACCCCTCCTTAGTGAAATTATGGTACCTAGTTAGAGAAAGAA
CCCATAGTAGGAGCAGAACCTCTATGTAGATGGGCAGCTAACAGGGAG
ACTAAATTAGGAAAAGCAGGATATGTTACTAACAAAGGAAGACAAAAGGTTG
TCCCCCTAACTAACACAACAAATCAGAAAACCTCAGTTACAAGCAATTATCTA
GCTTGCAGGATTCAAGGATTAGAAGTAAACATAGTAACAGACTCACAATATG
CATTAGGAATCATTCAAGCACAACCAGATAAAAGTGAATCAGAGTTAGTCAA
TCAAATAATAGAGCAGTTAAATAAAAAGGAAAAGGTCTATCTGGCATGGTA
CCAGCACACAAAGGAATTGGAGGAAATGAACAAGTAGATAAATTAGTCAGT
GCTGGAATCAGGAAAATCTATTAGATGGAATAGATAAGGCCAAGATG
AACATTAGTTTATGTCGACCTGCAGGGAAAGTTTATAGGTAGTTGATAG
AACAAAATACATAATTGTAAAAATAACTTCTTATACTAATATGACACG
ATTACCAATACTTTGTTACTAATATCATTAGTACAGCTACACCTTCTCA

FIG. 15D

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GACATCTAAAAAAATAGGTGATGATGCAACTTATCATGTAATCGAAATAATA
 CAAATGACTACGTTATGAGTGCTGGTATAAGGAGCCATTCCATTAT
 TCTTTAGCTGCTAAAAGCGACGTCTGTATTTGATAATTATACCAAGGATA
 AAATATCTTACGACTCTCCATACGATGATCTAGTTACAACATCACAATTAAA
 TCATTGACTGCTAGAGATGCCGGTACTTATGTATGTGCATTCTTATGACATC
 GCCTACAAATGACACTGATAAAAGTAGATTATGAAGAATACTCCACAGAGTTG
 ATTGTAAATACAGATAGTGAATCGACTATAGACATAACTATCTGGATCTAC
 ACATTACCCAGAAAAGTAGTTAAGCTTGTCTCCCTATAGTGAGTCGTATTAGA
 GCTTGGCGTAATCATGGTCATAGCTGTTCTGTGTGAAATTGTTATCCGCT
 CACAATTCCACACAAACATACGAGCCGGAACATAAAGTGTAAAGCCTGGGG
 TGCCTAATGAGTGAGCTAACTCACATTAAATTGCGTTGCGCTCACTGCCGCT
 TTCGAGTCGGGAAACCTGTCGTGCCAGCTGCATTAAATGAATCGGCCAACGC
 GCGGGGAGAGGGCGGTTGCGTATTGGGCGCTCTCCGCTTCCGCTCAC
 TGACTCGCTGCGCTCGGTCGTTGGCTGCAGCGAGCGGTATCAGCTCACT
 CAAAGGCGGTAAACGGTTATCCACAGAATCAGGGATAACGCAGGAAAGA
 ACATGTGAGCAAAAGGCCAGCAAAAGGCCAGGAACCGTAAAAGGCCGCG
 TTGCTGGCGTTTCGATAGGCTCCGCCCTGACGAGCATCACAAAAAT
 CGACGCTCAAGTCAGAGGTGGCGAAACCCGACAGGACTATAAAGATACCAG
 GCGTTCCCTGGAGCTCCCTCGTGCCTCTCCTGTTCCGACCCCTGCCG
 CTTACCGGATAACCTGTCCGCCCTTCTCCCTCGGGAAAGCGTGGCGCTTCT
 CATAGCTCACGCTGTAGGTATCTCAGTTGGTGTAGGTCGTTGCTCCAAG
 CTGGGCTGTGACGAACCCCCCGTTAGCCGCTGCGCTGCCCTTATC
 CGGTAACTATCGTCTTGAGTCCAACCCGGTAAGACACGACTTATGCCACT
 GGCAGCAGCCACTGGTAACAGGATTAGCAGAGCGAGGTATGTAGGCGGTG
 CTACAGAGTTCTGAAGTGGTGGCCTAACTACGGCTACACTAGAAGGACAG
 TATTGGTATCTGCGCTCTGCTGAAGCCAGTTACCTCGGAAAAAGAGTTGG
 TAGCTCTTGATCCGGAAACAAACCACCGCTGGTAGCGGTGGTTTTGTT
 TGCAAGCAGCAGATTACGCGCAGAAAAAAAGGATCTAAGAAGATCCTTG
 ATCTTTCTACGGGGTCTGACGCTCAGTGGAACGAAAACACGTTAAGGG
 ATTTGGTCATGAGATTATCAAAAGGATCTCACCTAGATCCTTTAAATTA
 AAAATGAAGTTAAATCAATCTAAAGTATATGAGTAAACTTGGTCTGACA
 GTTACCAATGCTTAATCAGTGAGGCACCTATCTCAGCGATCTGTCTATTCG
 TTCACTCCATAGTTGCCTGACTCCCCGTCGTGTAGATAACTACGATAACGGGAG
 GGCTTACCATCTGGCCCCAGTGCTGCAATGATACCGCGAGACCCACGCTCA
 CCGGCTCCAGATTATCAGCAATAAACAGCCAGCCGGAAAGGGCCGAGCG
 CAGAAGTGGCCTGCAACTTATCCGCCCTCCAGTCTATTAAATTGTTGC
 CGGGAGCTAGAGTAAGTAGTTGCCAGTTAATAGTTGCGCAACGTTGTT
 GGCATTGCTACAGGCATCGTGGTGTACGCTCGTCTGGTATGGCTTCA
 TTCAGCTCCGGTCCCAACGATCAAGGCGAGTTACATGATCCCCCATGTTGT
 GCAAAAAAGCGGTTAGCTCCTCGGTCTCCGATCGTTGTCAGAAGTAAGT
 TGGCCGCAGTGTATCACTCATGGTTATGGCAGCACTGCATAATTCTCTTAC
 TGTCTGAGAATAGTGTATGCGGCACCGAGTTGCTCTGCCGGCGTCA
 ATACGGGATAATACCGGCCACATAGCAGAACCTTAAAGTGTCTCATCATTG
 GAAAACGTTCTCGGGCGAAAACCTCAAGGATCTTACCGCTGTTGAGAT
 CCAGTTGATGTAACCCACTCGTCACCCAACTGATCTCAGCATCTTAC

FIG. 15E

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TTTCACCAGCGTTCTGGGTGAGCAAAACAGGAAGGCAAAATGCCGAAA
AAAGGGAATAAGGGCGACACGGAAATGTTGAATACTCATACTCTTCCTTTT
CAATATTATTGAAGCATTATCAGGGTTATTGTCTCATGAGCGGATACATATT
TGAATGTATTAGAAAAATAACAAATAGGGTCCCGCGCACATTCCCCGA
AAAGTGCCACCTGACGTCTAAGAAACCATTATTATCATGACATTAAACCTATAA
AAATAGGCGTATCAGGAGGCCCTTCGTCGCGCGTTCGGTATGACGG
TGAAAACCTCTGACACATGCAGCTCCGGAGACGGTCACAGCTGTCTGTA
AGCGGATGCCGGGAGCAGACAAGCCGTCAGGGCGTCAGCGGGTGT
GGCGGGTGTGGGGCTGGCTTAACATGCGGCATCAGAGCAGATTGTACT
GAGAGTGCACCATATGCGGTGTGAAATACCGCACAGATGCGTAAGGAGAAA
ATACCGCATCAGGCCATTGCCATTAGGCTGCGCAACTGTTGGAAAGG
GCGATCGGTGCGGGCCTTCGCTATTACGCCAGCTGGCGAAAGGGGGAT
GTGCTGCAAGGCATTAGTTGGTAACGCCAGGGTTTCCCAGTCACGAC
GTTGTAAAACGACGCCAGTGAATTGGATTAGGTGACACTATA

New Psyn II Promoter which controls ADA envelope expression:

TAAAAAAATGAAAAAAATTCTAATTAGGACGGTTTGATTTCTTTTTC
TATGCTATAAAATAATAAAATA

ADA envelope truncated:

ATGAAAGTGAAGGGGATCAGGAAGAATTATCAGCACTTGTGGAAATGGGGC
ATCATGCTCCTGGATGTTGATGATCTGTAGTGCTGTAGAAAATTGTGGG
TCACAGTTATTATGGGGTACCTGTGTGGAAAGAACCAACCAACTCTATT
TTGTGCATCAGATGCTAAAGCATATGATAACAGAGGTACATAATGTTGGCC
ACACATGCCTGTGTACCCACAGACCCCAACCCACAAGAAGTAGTATTGGAA
AATGTGACAGAAAATTAAACATGTGGAAAAATAACATGGTAGAACAGATGC
ATGAGGATATAATCAGTTATGGGATCAAAGCCTAAAGCCATGTGTAAAATT
AACCCCACCTGTGTACTTTAAATTGCACTGATTGAGGAATGTTACTAATA
TCAATAATAGTAGTGAGGGAAATGAGAGGGAAATAAAACTGCTTTCAA
TATCACCACAAGCATAAGAGATAAGGTGAAGAAAGACTATGCACTTTCTAT
AGACTTGATGTAGTACCAATAGATAATGATAACTAGCTATAGTTGATAAAA
TTGTAATACCTCAACCATTACACAGGCCTGTCCAAAGGTATCCTTGAGCCA
ATTCCCATACATTATTGTACCCGGCTGGTTTGCATTCTAAAGTGTAAAG
ACAAGAAGTTCAATGGAACAGGGCCATGTAAAAATGTCAGCACAGTACAAT
GTACACATGGAATTAGGCCAGTAGTGTCAACTCAACTGCTGTAAATGGCAG
TCTAGCAGAAGAAGAGGTAGTAATTAGATCTAGTAATTACAGACAATGCA
AAAAACATAATAGTACAGTTGAAAGAATCTGTAGAAATTAAATTGTACAAGACC
CAACAACAATACAAGGAAAAGTATACATATAGGACCAGGAAGAGCATTAT
ACAACAGGAGAAATAATAGGAGATAAAGACAAGCACATTGCAACATTAGTA
GAACAAAATGGAATAACACTTTAAATCAAATAGCTACAAAATTAAAAGAACAA
TTTGGGAATAATAAAACAATAGTCTTAATCAATCCTCAGGAGGGACCCAG
AAATTGTAATGCACAGTTTAATTGTGGAGGGAAATTCTTCACTGTAATTCA
ACACAACAGTAAATAGTACTTGGAAATTAAATTGGTACTTGGAAATTAAACACA

FIG. 15F

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ATCGAATGGTACTGAAGGAAATGACACTATCACACTCCCATGTAGAATAAAA
CAAATTATAAATATGTGGCAGGAAGTAGGAAAAGCAATGTATGCCCTCCA
TCAGAGGACAAATTAGATGCTCATCAAATATTACAGGGCTAATATTAACAAG
AGATGGTGGAACTAACAGTAGTGGGTCGAGATCTCAGACCTGGGGAG
GAGATATGAGGGACAATTGGAGAAGTGAATTATATAAATATAAAGTAGTAAA
AATTGAACCATTAGGAGTAGCACCCACCAAGGCAAAAAGAAGAGTGGTGCA
GAGAGAAAAAGAGCAGTGGAACGATAGGAGCTATGTCCTGGTTCTT
GGGAGCAGCAGGAAGCACTATGGCGCAGCGTCAATAACGCTGACGGTAC
AGGCCAGACTATTATTGTCTGGTATAGTCAACAGCAGAACAAATTGCTGAG
GGCTATTGAGGCAGAACAGCATCTGTTGCAACTCACAGTCTGGGCATCAA
GCAGCTCCAGGCAAGAGTCCTGGCTGTGGAAAGATACCTAAGGGATCAACA
GCTCCTAGGGATTGGGGTTGCTCTGGAAAACACTCATCTGCACCACTGCTGT
GCCTTGGAAATGCTAGTTGGAGTAATAAAACTCTGGATATGATTGGATAAC
ATGACCTGGATGGAGTGGAAAGAGAAATCGAAAATTACACAGGCTTAATAT
ACACCTTAATTGAGGAATCGCAGAACCAACAAGAAAAGAATGAACAAGACTT
ATTAGCATTAGATAAGTGGCAAGTTGTGGAATTGGTTGACATATCAAATT
GGCTGTGGTATGTAAAAATCTTCATAATGATAGTAGGAGGCTTGATAGGTTT
AAGAATAGTTTACTGTACTTCTATAGTAAATAGAGTTAGGCAGGGATACT
CACCATTGTCAATTCAAGACCCACCTCCCAGCCCCGAGGGGACCCGACAGG
CCCGAAGGAATCGAAGAAGAAGGTGGAGACAGAGAC

PmH5 promoter (which controls HXB2 gag pol expression):

AAAAATTGAAAATAAATACAAAGGTTCTGAGGGTTGTGTTAAATTGAAAGC
GAGAAATAATCATAAATA

HXB2 gag pol (with safety mutations, Δ integrase):

ATGGGTGCGAGAGCGTCAGTATTAAGCGGGGGAGAATTAGATCGATGGGA
AAAAATTGGTTAAGGCCAGGGGGAAAGAAAAAATATAAATTAAAACATATA
GTATGGCAAGCAGGGAGCTAGAACGATTGCGAGTTAACCTGGCCTGTTA
GAAACATCAGAAGGCTGTAGACAAATCTGGACAGCTACAACCCTCCCT
CAGACAGGATCAGAAGAACTTAGATCATTATAATACAGTAGCAACCCCT
ATTGTGTGCATCAAAGGATAGAGATAAAAGACACCAAGGAAGCTTAGACAA
GATAGAGGAAGAGCAAAACAAAGTAAGAAAAAGCACAGCAAGCAGCAGC
TGACACAGGACACAGCAATCAGGTCAGCCAAATTACCTATAGTCAGAA
CATCCAGGGCAAATGGTACATCAGGCCATATCACCTAGAACCTTAAATGCA
TGGTAAAAGTAGTAGAAGAGAAGGCTTCAGCCCAGAAGTGTACCCATG
TTTCAGCATTATCAGAAGGAGCCACCCACAAGATTAAACACCATGCTAA
ACACAGTGGGGGACATCAAGCAGCCATGCAAATGTTAAAGAGACCATCA
ATGAGGAAGCTGCAGAATGGATAGAGTGCATCCAGTGCATGCAGGGCCT
ATTGCACCAGGCCAGATGAGAGAACCAAGGGGAAGTGACATAGCAGGAAC
TACTAGTACCCCTCAGGAACAAATAGGATGGATGACAAATAATCCACCTATC
CCAGTAGGAGAAATTATAAAAGATGGATAATCCTGGGATTAAATAAAAG
TAAGAATGTATAGCCCTACCAGCATTCTGGACATAAGACAAGGACAAAGA
ACCCTTAGAGACTATGTAGACCCTGTTCTATAAAACTCTAAGAGCCGAGCAA

FIG. 15G

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GCTTCACAGGAGGTAAAAAATTGGATGACAGAAACCTTGTGGTCCAAAATG
 CGAACCCAGATTGTAAGACTATTTAAAAGCATTGGGACCAGCGGCTACACT
 AGAAGAAATGATGACAGCATGTCAGGGAGTAGGAGGACCCGGCCATAAGG
 CAAGAGTTTGGCTGAAGCAATGAGCCAAGTAACAAATTAGCTACCTAAT
 GATGCAGAGAGGGCAATTTAGGAACCAAAGAAAGATTGTTAAGTGTTCAT
 TGTTGCAAAGAAGGGCACACAGCCAGAAATTGCAGGGCCCTAGGAAAAAA
 GGGCTGTTGGAAATGTGGAAAGGAAGGACACCAAATGAAAGATTGTACTGA
 GAGACAGGCTAATTTTGTAGGAAAGATCTGGCCTCCTACAAGGGAAAGGCC
 AGGGAAATTTCAGAGCAGACCAGAGCCAACAGCCCCACCAAGAAGAGAG
 CTTCAGGTCTGGGTAGAGACAACAACCTCCCCCTCAGAAGCAGGAGGCCGAT
 AGACAAGGAACGTATCCTTAACCTCCCTCAGATCACTCTTGGCAACGAC
 CCCTCGTCACAATAAGATAAGGGGGCAACTAAAGGAAGCTCTATTAGATA
 CAGGAGCAGATGATACAGTATTAGAAGAAATGAGTTGCCAGGAAGATGGA
 AACCAAAAATGATAGGGGGATTGGAGGTTTATCAAAGTAAGACAGTATGA
 TCAGATACTCATAGAAATCTGTGGACATAAGCTATAGGTACAGTATTAGTA
 GGACCTACACCTGTCAACATAATTGGAAGAAATCTGTTGACTCAGATTGGTT
 GCACCTTAAATTTCCTTACAGGCCATTGAGACTGTACCTAGTAAATTAAAG
 CCAGGAATGGATGGCCAAAAGTTAAACAATGCCATTGACAGAAGAAAAAA
 ATAAAAGCATTAGTAGAAATTGTACAGAAATGGAAAAGGAAGGGAAAATT
 CAAAAATTGGCCTGAGAATCCATACAATACTCCAGTATTGCCATAAGAA
 AAAAGACAGTACTAAATGGAGGAAATTAGTAGATTCTAGAGAACTTAATAAG
 AGAACTCAAGACTCTGGGAAGTTCAATTAGGAATACCACATCCCGCAGGG
 TTAAAAAAGAAAAATCAGTAACAGTACTGGATGTGGGTGATGCATATTTC
 AGTTCCCTTAGATGAAGACTTCAGGAAGTATACTGCATTACCATACCTAGT
 ATAAACAATGAGACACCAGGGATTAGATATCAGTACAATGTGCTTCACAGG
 GATGGAAAGGATCACCAGCAATTCCAAAGTAGCATGACAAAAATCTAGA
 GCCTTTAAAAACAAAATCCAGACATAGTTATCAATACATGAACGATT
 TGTATGTAGGATCTGACTTAGAAATAGGGCAGCATAGAACAAAAATAGAGGA
 GCTGAGACAACATCTGTTGAGGTGGGACTTACCAACACCAGACAAAAACA
 TCAGAAAGAACCTCCATTCTTGGATGGTTATGAACTCCATCCTGATAAA
 TGGACAGTACAGCCTATAGTGCTGCCAGAAAAAGACAGCTGGACTGTCAT
 GACATACAGAAGTTAGTGGGGAAATTGAATACCGCAAGTCAGATTACCA
 GGGATTAAAGTAAGGCAATTATGTAACCTCTAGAGGAACCAAAGCACTAA
 CAGAAGTAATACCAACTAACAGAAGCAGAGCTAGAACTGGCAGAAAACA
 GAGAGATTCTAAAAGAACCAAGTACATGGAGTGTATTATGACCCATCAAAGA
 CTTAATAGCAGAAATACAGAAGCAGGGCAAGGCCATGGACATATCAAAT
 TTATCAAGAGCCATTAAAAATCTGAAAACAGGAAAATATGCAAGAATGAGG
 GGTGCCACACTAATGATGTAACACAATTACAGAGGCAGTGCAAAAAATAA
 CCACAGAAAAGCATAGTAATATGGGGAAAGACTCCTAAATTAAACTACCCAT
 ACAAAAGGAAACATGGAAACATGGTGGACAGAGTATTGGCAAGGCCACCTG
 GATTCTGAGTGGAGTTGTTAATACCCCTCCTTAGTGAATTATGGTAC
 CAGTTAGAGAAAGAACCCATAGTAGGAGCAGAAACCTCTATGTAGATGGG
 GCAGCTAACAGGGAGACTAAATTAGGAAAAGCAGGATATGTTACTAACAAA
 GGAAGACAAAAGGTTGTCCTAACTAACACAACAAATCAGAAAACACTCAGT
 TACAAGCAATTATCTAGCTTGCAGGATTAGAAGTAAACATAGTA
 ACAGACTCACAATATGCATTAGGAATCATTCAAGCACAACCAGATAAGTG

FIG. 15H

MVA EXPRESSING MODIFIED HIV ENVELOPE, GAG, AND POL

GENES

Moss et al.

Appl. No.: Unknown

Atty Docket: NIH211.001C1

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AATCAGAGTTAGTCAATCAAATAATAGAGCAGTTAATAAAAAGGAAAAGGT
CTATCTGGCATGGGTACCAAGCACACAAAGGAATTGGAGGAAATGAACAAAGT
AGATAAAATTAGTCAGTGCTGGAATCAGGAAAATACTATTTTAGATGGAATA
GATAAGGCCAAGATGAACATTAG

FIG. 15I

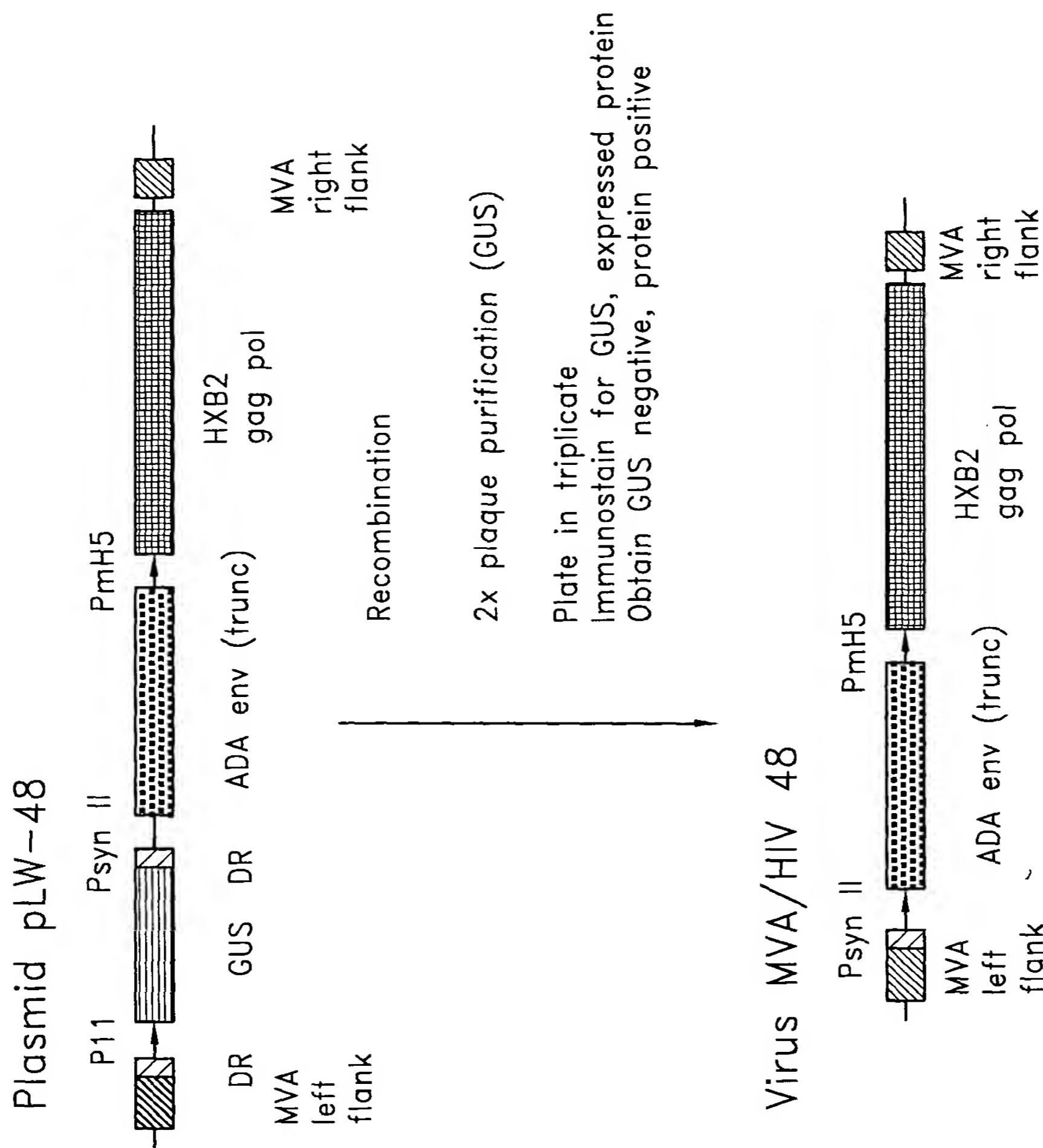


FIG. 16

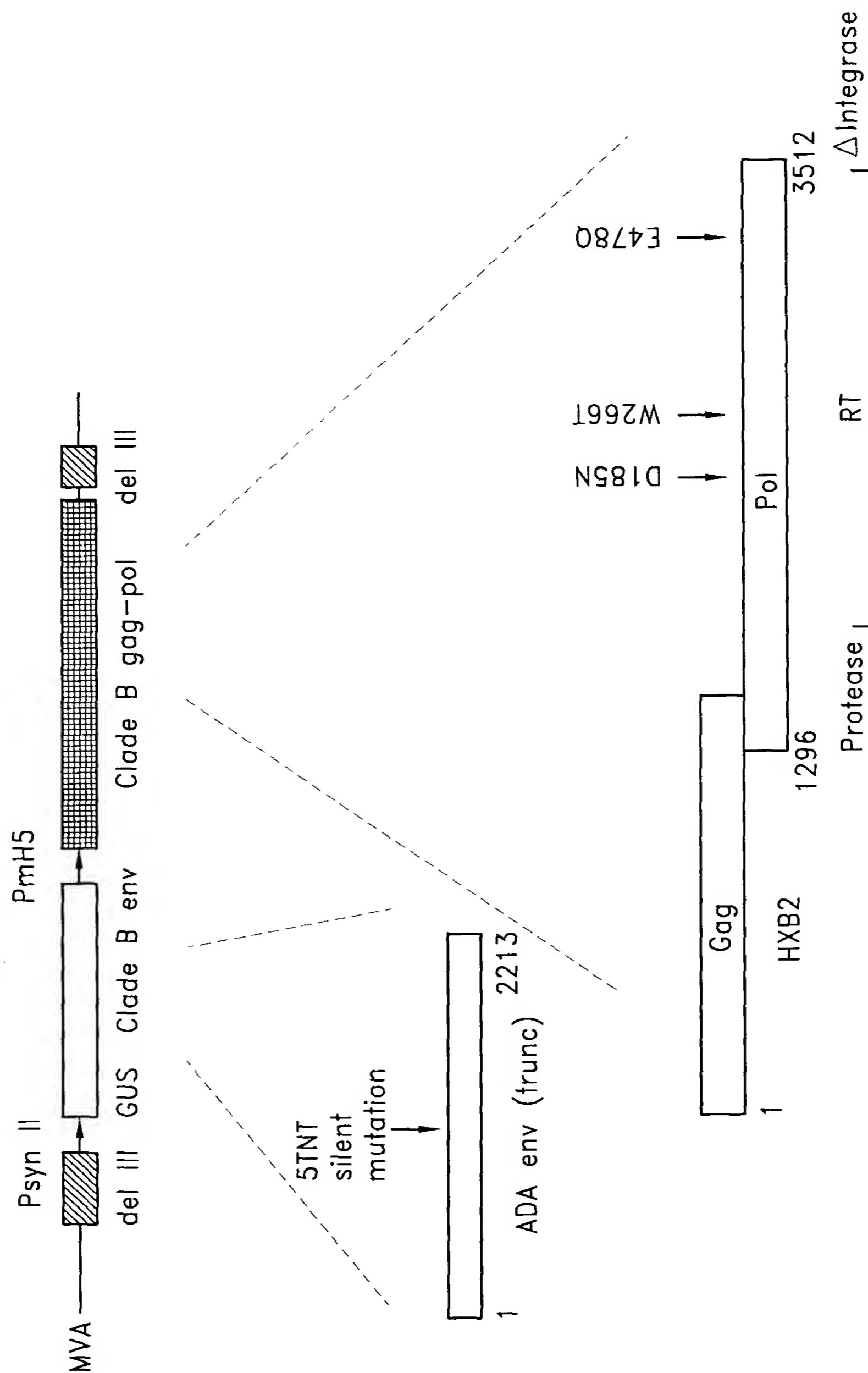


FIG. 17

Sequence of new Psyn II promoter:

Early part of promoter

Critical region

Early start site

●

TAAAAATGAAAAATTCTAATTAGGACGGT

Late part of promoter

TTTGATTCTTTCTATGCTATAAATAAATA

FIG. 18